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**FINAL DRAFT**

**Department of Defense**

**Medical Military Construction**

**MEDICAL DESIGN INSTRUCTIONS**

**for**

**Medical MILCON PROJECT**

**Design-Bid-Build Acquisition Process**

**XXXXXXXXXXXXXXXXXXXX**

**XXXXXXXXXXXXXXXXXXXX**

**PN XXXX / FY 200X**

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U.S. Army Corps of Engineers  
Medical Facilities Mandatory Center of Expertise (CEHNC-MX)  
Humphreys Engineer Center  
7701 Telegraph Road  
Alexandria, VA 22315-3813



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## Section 1 – Administrative Requirements

- 1.1 Introduction – This document, in conjunction with the UFC 4-510-1(Design: Medical Military Facilities), and other referenced criteria and documents outline the procedures to be followed by the Project Delivery Team (PDT) for acquisition of the subject project.
- 1.2 Authorization – Specific documents authorizing the project can be found as attachments to these Medical Design instructions. The Office of the Assistant Secretary of Defense - Health Affairs (OSDA-HA) (Attachment 1a), provides authority to the U.S. Army Corps of Engineers (USACE). The Program Amount, referenced by this authorization, is provided by the Design Authorization (Attachment 1b) and the DD Form 1391 programming document (Attachment 2). This is the overall programmed (budgeted) amount for the construction of this project. The total programmed scope (gross area) is also provided by the Design Authorization, the DD Form 1391, and the Program for Design (PFD) (Attachment 3). The PFD shall be the basis for space planning.
- 1.3 Design Principals and Objectives - It is the intended objective of the PDT that the project responds to the functional requirements of the Using Service, incorporates the most up-to-date design techniques, and employs the latest technology. It is the goal of the PDT to complete this project within scope and budget, on schedule, and ensure it is of the highest quality commensurate with the available funding. Reference DoD policy regarding design and construction UFC 4-510-1, Section 1, paragraph 1.3.  
([http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf)).
- 1.4 Roles and Responsibilities
  - 1.4.1 The Office of the Assistant Secretary of Defense - Health Affairs (OASD-HA), represented by the TRICARE Management Activity – Portfolio Planning and Management Division (TMA-PPMD), authorizes projects for the Using Services. TMA-PPMD is responsible for project programming, budgeting, design authorization, design review and certification for submittals S2 and S4, and construction authorization.
  - 1.4.2 U.S. Army Health Facility Planning Agency (USAHFPA), acting for the U.S. Army Office of the Surgeon General, represents the Using Service on all matters relating to medical-functional planning and requirements within the five-foot lines of the primary facility. All input from the local installation medical staff pertaining to project scope, design requirements and review comments will be submitted through channels to USAHFPA for evaluation and submittal, if appropriate, to the USACE for action.

### INPUT NEEDED FOR AIR FORCE

- 1.4.3 Directorate of Installation Support (DIS), and other installation organizations, acting for the Installation Commander, on the development of installation related criteria and requirements outside the five-foot lines of the primary facility. All input from local installation non-medical staff will be submitted through channels to the USACE District of the U.S. Army Corps of Engineers for action.

## INPUT NEEDED FOR AIR FORCE

- 1.4.4 The U.S. Army Corps of Engineers (USACE) is the DoD designated Design and Construction Agent for this project. The USACE Headquarters (HQUSACE), the Huntsville Engineering and Support Center - Medical Facilities Mandatory Center of Expertise (CEHNC-MX), geographic USACE Major Subordinate Command (MSC) or Regional Business Center (RBC), geographic USACE District, and the selected Architect-Engineer (A-E) firm(s) are responsible for compliance with the goals, objectives and policies involved in the design and construction of the project. Conflicts regarding these matters will be resolved by the USACE and the using service. Any coordination required with the using service by the A-E will be through CEHNC-MX or the USACE District.
- 1.4.4.1 Headquarters USACE is the program manager for the USACE Medical MILCON program and is the primary USACE Point of Contact for OASD-HA. The Directorate of Military Programs (CEMP) will be the primary point-of-contact between TMA-PPMD and the USACE. The Programs Management Division, Programs Integration Division (CEMP-II) will execute this responsibility on behalf of CEMP. CEMP-II will:
- a. Serve as the primary point-of-contact for all medical program management issues with the TMA-PPMD, the military services' Surgeon Generals and engineering organizations, and other federal Headquarters level organizations involved with the design, construction or maintenance of medical facilities.
  - b. Represent the USACE on a Corporate Group providing program and project oversight during design and construction. The Corporate Group is composed of representatives from the associated Military Services, and CEMP-II. The Corporate Group will provide executive program coordination; resolve conflicts; and approve, direct, or request changes where necessary to execute the program on schedule and within scope and cost limitations. This responsibility will not be delegated.
  - c. Perform all Program Management functions for the medical design and construction programs. This role includes HQ level Quality Assurance of DD Form 1391 for DoD medical MILCON projects to include non-medical aspects of the projects (in coordination with CEHNC-MX), coordination and issuing design and construction directives to USACE RBCs/Districts, and oversight of program design and construction funds. It encompasses oversight functions such as evaluation, analysis, and reporting of execution performance at the quarterly Command Management Reviews (CMR), representation and input at the Project Review Board (PRB), and presentation at the TMA-PPMD quarterly reviews.
  - d. Request and receive authorizations from TMA-PPMD and in turn issue design and construction directives and funds to the RBC and district commands.
  - e. Coordinate project management activities during design and construction phases and upon receipt of certification that design has reached one hundred percent design completion and the current working estimate (CWE) is within TMA-PPMD authorized funded amount (Programmed Amount (PA) or Design Directed Amount (DDA)), request authority to

advertise the project for construction. Once request is approved by TMA-PPMD, CEMP-II will issue directives to the RBC/district authorizing contract solicitation.

f. Provide the latest approved DD Form 1391 to the HQUSACE Cost Engineer (CECW-EI). Ensures that the Concept Design (35%) Cost Estimate, also known as the Code-B Current Working Estimate (CWE), is prepared in accordance with ER 1110-1-1300, Cost Engineering Policy and General Requirements and TM 5-800-4, Programming Cost Estimates for MILCON, guidance and submitted electronically on ENG Form 3086 to HQUSACE Cost Engineer for review by April 1 of the Design Year (DY). Any discrepancies in the Primary Facility scope between the DD Form 1391 and the ENG Form 3086 will be resolved by CEMP-MD in coordination with CEHNC-MX. (The funding for CECW-EI will be provided from the headquarters O&M account.)

g. Provide bid-opening data and proposed Current Working Estimate (CWE) to TMA-PPMD, or other customers, and request authority to award the project. Based on authority to award and funds availability, CEMP-II will issue the construction directive with authority to award and coordinate the release of construction funds to the RBC/District, at the TMA-PPMD approved CWE. Ensure that the PDT reports the award cost data into the Historic Analysis Generator (HAG) database system, in accordance with the memorandum, CECW-EIC, Reporting of HAG, 15 Mar 2002 (web address [http://www.hq.usace.army.mil/cemp/cempm/policy/HAG Reporting 6Aug.doc](http://www.hq.usace.army.mil/cemp/cempm/policy/HAG%20Reporting%206Aug.doc).) within 30 days from the date of construction award.

h. Participate in the execution of Medical MILCON projects as a member of the PDT and Corporate Group member.

1.4.4.2 The USACE Medical Facilities Mandatory Center of Expertise (CEHNC-MX) is the USACE-wide Medical Center of Expertise (MX) for medically unique aspects of medical and medical research facilities. The MX provides technical expertise for the delivery of the highest quality medical and medical research facilities for the Department of Defense (DoD), other Federal agencies, and other customers. CEHNC-MX will provide expertise on medical technical issues, criteria/guidance, medical-related specifications and standards. The CEHNC-MX shall also provide oversight and direction to the RBC/Districts on concept and final design management, design acquisition strategy, medical criteria, contracting procedures, and construction issues. Changes to USACE technical criteria shall be proposed through CEHNC-MX for approval by HQUSACE, TMA-PPMD, and from the DoD Health Facilities Steering Committee, as appropriate. The MX will:

a. Provide oversight, coordination and direction of all medical facilities through 35 percent design, i.e., work directly with the selected A-E, provide guidance and interpret criteria as required (except medical-functional criteria which will be interpreted by the suing service), conduct comprehensive technical reviews, and assist the USACE District Project Manager and Contracting Officer on matters within the scope of the A-E contract. Review project development documentation (DoDM Project Books in accordance with UFC 4-510-01), Programs for Design (PFD) and Concepts of Operation. CEHNC-MX shall also provide advice and assistance to the RBC/District and Military Service in determination of

recommended procurement method (acquisition strategy) and coordinate with CEMP-II. CEHNC-MX shall participate as a voting member on A-E pre-selection and final selection boards for all medical projects.

b. Assist and advise the RBC/Districts as requested. Assist the RBC/Districts by preparing the project initiation documentation, draft FedBizOp announcement, Architect Engineer (A-E) Scope of Work, project-specific Design Instructions, and design Submission Documentation Requirements.

c. Approve deviations in the A-E scope of work, required design standards/policy, and required submissions to TMA-PPMD.

d. Coordinate and certify the technical adequacy and completeness of the concept design, including the mandatory concept design submissions to TMA-PPMD. Review all design submissions, attend review conferences and provide documentation to TMA-PPMD that the design includes the required medical systems, equipment, supporting systems, equipment requirements, information systems, to provide a complete and useable project within the TMA-PPMD authorized scope and Program for Design.

e. Provide a thorough final design technical review of medically unique features and provide TMA written documentation that the project complies with all medically unique technical requirements. Participate in the final design review conferences to ensure medical design unique criteria and standards are adhered to, as approved by TMA-PPMD at the 35% design.

f. In accordance with HQUSACE policy, act as the USACE Authority Having Jurisdiction (AHJ) for application and interpretation of Fire Protection/Life Safety codes and criteria for medical and research facilities.

g. Provide medically unique technical direction during construction as requested by the RBC/District. Support CEMP-II in managing all medical MILCON (design and construction) funds. Assist CEMP-II in the development of standardized PMPs/IMPs, and advises CEMP-II on any RBC and/or district command requests for deviation.

1.4.4.3 USACE Major Subordinate Command (MSC) / Regional Business Center (RBC), The MSC/RBC will provide management oversight of the USACE District activities and coordinate with HQUSACE and CEHNC-MX. The MSC/RBC will:

a. Be accountable and responsible for the performance of the USACE District, and their other geographic districts that may be required, to assure project execution within the scope and cost authorized and approved by TMA-PPMD.

b. Provide executive direction and management to subordinate districts and resource management for work within their geographical area of operations. Ensure that the USACE District obtains the required coordination and approvals of the design from the CEHNC-MX.

- c. Provide oversight of district design and construction budget, coordinate with CEHNC-MX for approval of deviations from design scope, schedules and design submissions.
  - d. As applicable, CENAD and/or the USACE District shall chair and conduct A-E pre-selection and final selection boards and include the CEHNC-MX, TMA-PPMD, and the **USAHFPA** as voting members on each. **Edit for Air Force**
  - e. As applicable, participate with their geographical district(s) in organizing and conducting Post Occupancy Evaluations on completed medical and medical research projects.
  - f. Represent CEMP-II during construction quarterly Corporate Group meetings to review and approve discretionary (non-mandatory changes), as determined in the Project Management Plan and/or Intensive Management Plan for construction, or as directed by TMA-PPMD.
- 1.4.4.4 USACE Regional Integration Team (RIT) will be empowered to work with any level of the USACE organization and with external stakeholders to build relationships and to resolve regional issues in coordination with CEHNC-MX. Upon receiving authority from TMA-PPMD, the RIT will issue project directives to the district, as well as Planning and Design funding, as well as construction funding.
- 1.4.4.5 The USACE District is the USACE Contracting Authority with administrative and technical responsibilities of the Design and Construction Agent. The District will:
- a. Administer the A-E contract for Concept Design development and final design/construction document development. All contractual matters are the responsibility of the USACE District Contracting Officer. If any guidance or review comment is considered to be beyond the scope of the A-E contract, the A-E must not proceed with the issue in question until authorized to do so, in writing, by the Contracting Officer.
  - b. As required for reimbursable funding items, such as design during construction (DDC) or construction supervision and administration (S&A), fund and resource CEHNC-MX (organization code A0L0400) in P2.
  - c. Develop the design and construction budget, coordinate with the CEHNC-MX for approval of deviations from the design scope, schedules and design submissions. Prepare an Independent Government Estimate (IGE) of estimated construction costs at each stage of design completion.
  - d. Coordinate and obtain approvals of the design from the CEHNC-MX. Obtain approval/concurrence from CEHNC-MX on all major design and construction issues relating to medically unique technical features of the facility. Coordinate with and involve CEHNC-MX on the construction status and proposed changes throughout the construction duration. Coordinate with CEHNC-MX on S&A budgets for support during construction.



- e. Execute design development and construction management. Provide for thorough non-medical related technical design reviews, lead all technical design review conferences with appropriate district technical representation, and ensure completion of comprehensive construction Quality Assurance reviews of all design submissions. Staff design review conferences with appropriate disciplines.
  - f. As applicable, determine with the RBC the appropriate chairperson and conduct A-E pre-selection and final selection boards, including the CEHNC-MX, TMA-PPMD and USAHFPA as voting members on each board.
  - g. As applicable, in coordination with the RBC, CEHNC-MX, the using Services, and TMA-PPMD, be responsible for organizing and conducting Post Occupancy Evaluations (POE) on completed medical and research projects.
- 1.5 Management Plans. As required by ER 5-1-11 (<http://www.usace.army.mil/inet/usace-docs/eng-regs/er5-1-11/entire.pdf>), the USACE District will prepare a Project Management Plan (PMP), which will include a Construction Management Plan (CMP), for this project.
- 1.5.1 The Project management Plan (PMP) will establish all requirements for management and control of the project from acquisition planning through completion of construction, commissioning, and turnover to the Using Service. The USACE District Project Manager will develop the PMP. A draft PMP will be available for review at the Prenegotiation Conference.
- 1.5.2 Construction Management Plan (CMP). The CMP will be included in draft form with the PMP and will be finalized during final design/construction/commissioning document development. A draft CMP will be included with the Concept Design Submittal/Submittal S4. Comments on the draft CMP will be provided as part of the review of this submittal. The USACE District Project Manager will make necessary revisions in accordance with the comments and submit the final CMP for approval prior to award of the construction contract.
- 1.6 General A-E Contract Requirements
- 1.6.1 The selected A-E shall be responsible for the professional quality, technical accuracy, and complete coordination of all design and other services furnished under the A-E contract. In accordance with UFC 4-510-1, Section 2, paragraph 2.6.3 ([http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf)) the A-E will be held fully accountable for the design in accordance with the "Responsibility of the Architect-Engineer Contractor" clause set out in Federal Acquisition Regulations (FAR) 52.263-23 (<http://www.arnet.gov/far/>). Quality control of design development to ensure coordination of all design disciplines is the responsibility of the A-E. The A-E shall, without additional compensation, correct any errors or deficiencies in the drawings, specifications, and any other products and services due to lack of coordination. The A-E shall notify the USACE District of any data not provided within the time frame promised.

- 1.6.2 The A-E shall not communicate directly with TMA-PPMD. All communication with TMA-PPMD shall be through the Project Director (CEHNC-MX) and coordinated with the USACE District Project Manager.
- 1.6.3 Pre-negotiation Conference. The USACE Medical Facilities Mandatory Center of Expertise (CEHNC-MX) will chair a Pre-negotiation Conference to review contractual requirements for the project and discuss design requirements. Invitees shall include the Using Service, representatives of the Using Service Surgeon General, the Installation, the USACE USACE District, and the A-E.
- 1.6.4 Confirmation Notices. The A-E shall provide records of all meetings (including the Fact-Finding Session/Charrette Report), site visits, review conferences, in-progress work sessions, discussions, verbal directions, telephone conversations, etc. in which the A-E, or their representative(s), participate on matters relative to the project. These records, entitled Confirmation Notices, shall be numbered sequentially and shall fully identify participating personnel, subject(s) discussed, and any guidance given and/or conclusions reached. Distribution of Confirmation Notices shall take place not more than seven days after the event, except those for the minutes of meetings (including the Fact-Finding Session/Charrette) and review conferences, which shall be distributed not more than 14 days after the event. Confirmation Notices shall be distributed in accordance with Subparagraph 11.0 F, Submittal Distribution Matrix (SDM), (Attachment 6) herein. Distribution of Confirmation Notices and supporting materials shall be by electronic means to the greatest extent possible.
- 1.6.5 A-E Contract. The basic A-E contract will consist of the following elements:
- 1.6.5.1 Fact-Finding Session/Charrette. A Fact-Finding Session/Charrette will be held at the Installation to establish "an initial design concept" for the project. This initial design concept must be acceptable to all key Using Service and USACE representatives before continuing with Concept Design development. In accordance with UFC 4-510-1 Section 1, paragraph 1.9.3, a Site Investigation Visit shall precede the Fact-Finding Session/Charrette to ensure A-E familiarity with the site, availability of utilities and other local conditions. Site visit shall be documented by the A-E in accordance with these Instructions and include three alternative schematic block plan concepts (similar to the S1 level as defined by UFC 4-510-01) for presentation at the start of the formal charrette.
- 1.6.5.2 Schematic Design Submittal S2 (20 percent design). This submittal includes development of the room-by-room floor plans, elevations, and initial analysis of the major architectural and engineering systems based on the selected (or composite) S1-type block plan from the design charrette. The primary purpose of this submittal and review is to identify and resolve all major space program deficiencies at an early stage in design, develop the massing and esthetics of the facility, and "fix" the square area scope of the building. The Design Agent, using Military department representatives, and A-E, will present the reviewed S2 to TMA-PPMD. Requests for scope revisions with justification should be submitted at this time. Scope changes will not be entertained after approval of S2 unless fully justified. TMA-PPMD will provide approval/disapproval, with review comments, within 30 days of the presentation.

1.6.5.3 Submittal S3. This submittal is not applicable. **EDIT IF S3 REQUIRED.**

1.6.5.4 Concept Design Submittal S4 (35 percent design). This submittal is as a minimum 35 percent of the total design effort in all disciplines and includes a corrected and refined package based on the S2 review. The Design Agent and the using Military Department will submit the reviewed S4 to TMA-PPMD. A-E participation will be required. Final scope and PA (cost) shall be determined with this submission. This is considered the "technical submission" and all issues regarding costs, Value Engineering Study (VE), constructability, commissioning, phasing, and any other special studies must be resolved, though the results of all studies may not be incorporated prior to presenting this submission to TMA-PPMD for approval. Action taken on VE proposals must be included with this submission.

1.6.6 Contract Options: Final design/construction documents:

1.6.6.1 Submittal S5 (65 percent design). On a case-by-case basis, TMA-PPMD may request submission of 65 Percent Preliminary Working Drawings. The Design Agent, with the participation of the using Military Service, may develop the specific submittal requirements to define the S5 level of design effort.

1.6.6.2 Submittal S6 (100 percent design). When the design is complete, the Design Agent will submit a copy of the final documents (i.e. drawings, specification, cost estimate, instructions to bidders, etc.) to TMA-PPMD. Along with this package, the Design Agent shall provide a memorandum to TMA-PPMD certifying that the design has been completed and that all technical requirements and cost criteria approved at the S4 (35 percent design) stage have been incorporated into the Final Design.

1.6.6.3 Backcheck Submittal (100 percent design). Reference attached Submittal Requirements Outline for submittal requirements.

1.6.6.4 Corrected Finals (100 percent design). Reference attached Submittal Requirements Outline for submittal requirements.

1.6.6.5 Other Contract Options as may be identified such as Construction Phase Services, etc. Other contract options will be addressed on a case-by-case basis.

1.7 Submittal Format

1.7.1 The A-E shall provide design submittals for review in accordance with UFC 4-510-1, Appendix B, paragraph B.2.6. and the Submittal Requirements and Distribution Matrix (SRDM) Attachment 6. See Section 3, Submittal Requirements, for specific requirements for each design submittal.

1.7.2 Drawings. All design development drawings will be developed using a 3-D computer-aided design and drafting system. All contract drawings shall be created and developed using computer-aided design and drafting software and procedures conforming to Table 13 of the A-

E-C CADD Standards, and the criteria of the USACE District. Design submittal drawings shall be A1 (30"x42") and shall be suitable for half-size reproduction.

- 1.7.3 Submittal material, other than drawings, shall be in standard 3-ring (D ring) binders. Pages shall be standard 8-1/2" by 11" and shall include: cover sheet identifying the project title, project number, the A-E, date, and submittal phase; table of contents with page numbers; tabbed dividers between sections; and each page sequentially numbered.
- 1.7.4 In addition to the above hard copy submittals, all submittal materials, including drawings, shall be provided in electronic media on compact disks in accordance with the USACE USACE District guidance.
- 1.7.5 Provide with each the block plan schematic concepts for the charrette, and both Submittal S2 and the Concept Design Submittal/Submittal S4 a site layout plan, an architectural floor plan, at least one architectural exterior elevation in ".jpg" format, and a 3-D fly-by of the design(s).
- 1.7.6 In addition to the matted and framed renderings, required by UFC 4-510-1, Section 2, paragraph 2.7, and Appendix B, paragraph B.4.3, provide with Submittal S5 an architectural exterior rendering in ".jpg" format. Refer to SRDM (Attachment 6). The electronic media shall be suitable for viewing on computers not having CADD software.
- 1.7.7 Preparation of a briefing for the start of the charrette, the Submittal S2, and the Concept Design Submittal/Submittal S4 are required in PowerPoint format for TMA-PPMD presentations. An electronic copy of the required format will be provided to the A-E for their use in preparing the presentations.
- 1.8 Meetings and Review Conferences
  - 1.8.1.1 Meetings and review conferences, and any in-progress work sessions required for Concept Design and final design/construction document development will primarily be held at Ft. Detrick, MD or at locations to be determined at the Prenegotiation meeting. The A-E shall plan to attend the presentation of the Submittal S2 and the Concept Design Submittal/Submittal S4 to TMA-PPMD at their office in Falls Church, VA. It is highly recommend that the S2 and S4 review conferences be held in the Washington, DC metropolitan area, due to the requirement to make a formal presentation of each submission to TMA-PPMD. The Contracting Officer or the USACE District PM must be coordinated with on all site visits, meetings, review conferences, and in-progress work sessions.
  - 1.8.1.2 In-progress work sessions, if required, are intended to provide design assistance by evaluating A-E proposed alternatives based on the level of information presented. In-progress work sessions during Concept Design development shall be coordinated with CEHNC-MX.
  - 1.8.1.3 A-E architectural and engineering discipline representatives, appropriate to the required level of design development, shall attend the Fact-Finding Session/Charrette and all site visits, meetings, review conferences and in-progress work sessions.

## 1.8.2 Review Comments.

- 1.8.2.1 The Using Service and USACE will review the design submittals and enter review comments in the USACE Design Review and Checking System (DrChecks). The USACE District will provide the review comments for each design submittal to the A-E through the Internet using DrChecks.
- 1.8.2.2 Upon completion of each design submittal review conference, the A-E shall provide the Using Service and USACE with an "official" copy of the submittal review comments in DrChecks with annotations indicating the conference action on each comment and any additional notes pertaining to individual comments. This annotated copy of the review comments shall be included as part of the Confirmation Notice for the review conference minutes.
- 1.8.2.3 The A-E shall annotate review comments with Annotation Codes (representing "concur", "Do not Concur", "Check and Resolve", etc.) as provided by the DrChecks system.
- 1.8.2.4 Information on and access to DrChecks can be found at the following web sites:  
<http://www.buildersnet.org/DrChecks/Tour>,  
<https://65.204.17.188/projnet/home/version1/index.cfm>

## 1.9 Consultants

- 1.9.1 Qualified outside design consultants or qualified in-house design team members, as required for the following disciplines, shall be retained by the A-E. This expertise shall remain available during the entire course of project design. In the event that substitution for a required consultant(s) or in-house design team member(s) is proposed, the Contracting Officer and the CEHNC-MX shall be notified immediately in writing. The A-E shall furnish documentation indicating the experience and qualifications of the replacement consultant(s) or in-house design team member(s) for approval by the Contracting Officer.
- 1.9.1.1 Fire Protection Engineer (FPE). The design of this project requires the services of a qualified Fire Protection Engineer consultant if a qualified A-E in-house Fire Protection Engineering designer is not available. **A qualified fire protection engineer (the FPE) is an integral part of the design team, and must be involved in every aspect of the design as it relates to fire protection.** The Fire Protection Engineer or qualified in-house designer shall not simply be a consultant or reviewer of plans and specifications, but shall actively participate in design development as a full member of the A-E design team. Following are the minimum FPE qualifications:
  - REGISTRATION: For the purposes of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting one of the following conditions:
    - a. A registered professional engineer (P.E.) who has passed the fire protection engineering written examination administered by the National Council of Examiners for Engineering and Surveys (NCEES), or

b. A registered P.E. in a related engineering discipline with a minimum of 5 years experience, dedicated to fire protection engineering that can be verified with documentation.

- **EXPERIENCE:** For the purposes of meeting this requirement, a qualified fire protection engineer is defined as an individual meeting all of the following conditions: (NOTE: All experience must be verified with documentation.)

a. At least two years experience in the interpretation and application of NFPA 101 and/or life safety requirements of model building codes for healthcare facilities.

b. At least two years experience in the design and/or review of fire suppression systems and fire alarm systems, including experience in the review of shop drawings and sprinkler system hydraulic calculations, and in the interpretation and application of the National Fire Codes and/or other model building codes.

c. Minimum of 3 years experience in the design of healthcare and medical research facilities.

d. Minimum of 3 years experience in the testing of fire protection systems.

1.9.1.2 Communications Systems Engineering. The design of this project requires the services of a qualified Communications Systems Engineering consultant if a qualified A-E in-house Communications Systems Engineering designer is not available. Experience and qualification requirements for this discipline are as stated below. The Communications Systems Engineering consultant or qualified in-house designer, hereinafter referred to as the Communications Systems Engineer (CSE), **shall not simply be a consultant or reviewer of plans and specifications, but shall actively participate in design development as a full member of the A-E design team.** This involvement shall extend through all phases of design development including site investigation, systems design, cost engineering, and coordination with other design disciplines.

- Bachelor or Master of Science degree in Electronics Engineering or in Electrical Engineering and a minimum of five years of communications design experience. A minimum of three years of this experience shall be in the design of medical communications systems similar to those required by this project.

- Experience in the testing of all systems required by this project. The Communications Systems Engineering consultant, or qualified in-house designer, shall personally conduct all communications systems site investigations. The Communications Systems Engineering Consultant, or qualified in-house designer, shall not have any responsibility for electrical power distribution system design, electrical power distribution system site investigation, lighting systems design, or lighting systems site investigation.

1.9.1.3 X-ray Shielding. If applicable, the design of this project may require the services of a qualified X-ray Shielding consultant if a qualified A-E in-house X-ray Shielding designer is not available for the design of shielding for X-ray equipment not otherwise prescribed by the applicable Medical Design Guide Plates. The consultant or in-house designer shall be qualified as recommended in UFC 3-190-03A.

<http://www.hnd.usace.army.mil/techinfo/UFC/UFC3-190-03A/UFC%203-190-03A.pdf>

1.9.1.4 Commissioning. **(EDIT ACCORDING TO PROJECT SCOPE AND COMPLEXITY)** The design and construction of this project requires the services of a qualified Commissioning consultant(s) if qualified A-E in-house Commissioning expertise is not available. Experience and qualification requirements are as stated below. The Commissioning Consultant(s) shall not simply be a consultant or reviewer of plans and specifications, but shall actively participate in design development as a full member of the A-E design team. The Commissioning Consultant(s) shall assure that all HVAC, Power (including emergency generation), and Fire Alarm systems, and their interfaces, are “commissionable” as designed, with design documents providing for all monitoring, signaling, measuring, and adjustment and balancing equipment and instrumentation necessary to perform Performance Verification Testing. The Commissioning Consultant(s) shall assist in the development of comprehensive Performance Verification Testing procedures that shall establish the minimum detail and extent of those procedures required of the Construction Contractor’s Commissioning Plan, and the results to be demonstrated. As a minimum, the Commissioning Consultant shall consist of an HVAC Commissioning Expert, and an Electrical Power Systems Commissioning Expert, if a single individual is not available with qualifications for commissioning both. Minimum qualifications are:

- Minimum of a Bachelor of Science degree in Mechanical or Electrical Engineering and a minimum of five years of experience in commissioning HVAC and Power systems in large complex projects. A minimum of three years of this experience shall be in the commissioning of medical facilities of a scope and complexity similar to this project.

- Demonstrate significant field experience in the operation and troubleshooting of HVAC systems.

- Demonstrate significant field experience in the operation and troubleshooting of Electrical Power Systems, including Emergency Power Generation and Load Shedding Equipment.

- Demonstrate significant experience in the testing and balancing of air and water systems.

- Demonstrate expertise in the design, operation, and configuration of Digital Control Systems for HVAC equipment.

- Demonstrate expertise in the design, operation, and configuration of Electrical Power Equipment Controls.

1.9.1.5 Electrical Consultant. For facilities with inpatient functions, the AE firm must utilize an

electrical engineering consultant (EEC), if qualified in-house electrical engineering design personnel are not available. The AE shall submit qualifications for approval to the CEHNC-MX. The use of the same engineer to design power/lighting systems and communications systems is not permitted. The EEC shall design all phases of the project and shall be responsible for appropriate coordination with other disciplines, including cost estimating, for all systems listed in the Design Criteria References and these Design Instructions. The EEC shall have the following minimum qualifications:

- B.S. Degree in Electrical Engineering.
- Licensed professional engineer with a minimum of five years experience designing hospital normal and emergency power systems for projects of equivalent scope.
- Shall have been the lead design electrical engineer for the primary energy plant (emergency and normal power) of at least one project of equal scope, involving emergency generating plants with two or more generators operating in parallel, with load prioritization systems and equipment.
- Shall have significant experience in the start-up and testing of emergency generation plants.
- Shall have significant experience in the design of medium voltage distribution systems (15KV), including network type electrical substations and switching stations.

#### 1.10 Value Engineering

- 1.10.1 A Value Engineering (VE) study of the Concept Design Submittal/Submittal S4 shall be conducted in accordance with UFC 4-510-1, Appendix B, paragraph B.3.14. The USACE district may satisfy this requirement by contracting with the A-E (for a study by personnel not involved in the design of this project), or by contracting with another qualified A-E firm with medical research/laboratory experience. The A-E shall provide documents as identified by the USACE district to the VE study team concurrently with the transmittal of the Concept Design Submittal/Submittal S4 to the Using Service and USACE review offices. The A-E shall present this submittal to the VE study team at study commencement and may provide written review comments on the VE study initial report. The VE study team, or its representative(s), will present the VE study initial report and VE proposals to the Concept Design Submittal/Submittal S4 review conference for acceptance/non-acceptance by the conference. The A-E shall participate in this presentation. VE proposals accepted by the conference shall be so identified by the VE study team, along with any associated estimated cost savings (or increases). VE proposals not accepted by the conference shall also be identified, along with the reasons for non-acceptance. The VE study initial report, annotated to indicate conference actions, will be included by the A-E in the Concept Design Submittal/Submittal S4 Presentation to TMA-PPMD. The VE study team shall submit a final report documenting all actions on VE proposals. Accepted VE proposals shall be incorporated in the final design/construction documents by the A-E.



- 1.10.2 The validated cost estimate for construction of this project, included in the Concept Design Submittal/Submittal S4 Presentation to TMA-PPMD, shall take into consideration all estimated cost savings, or cost increases, resulting from the acceptance of VE proposals.
- 1.11 Biddability, Constructibility, Operability and Environmental (BCOE) Review. The USACE District will review the Concept Design Submittal/Submittal S4 for Biddability, Constructibility, Operability and Environmental compliance, in accordance with ER 415-1-11 <http://www.usace.army.mil/inet/usace-docs/eng-regs/er415-1-11/entire.pdf> and will update this review with each successive final design/construction document submittal.
- 1.12 Applicable Criteria
- 1.12.1 The A-E shall ensure that the project design is evaluated for code and criteria compliance with UFC 4-510-1, Sections 1 through 23 and all other applicable local, state and federal laws and regulations governing air quality, water quality, solid and hazardous waste disposal, etc. referenced herein. The A-E shall be responsible for identifying all permits (utility connections, tap-ins, meters, etc.) and fees relating to these permits. All costs relating to permits shall be identified in the Current Working Estimates for the project. The A-E shall not be responsible for obtaining permits, except for permits related to erosion and sediment control and storm water management that need to be obtained from local or state government bodies.
- 1.12.2 A list of current applicable criteria, codes and regulations can be found at Section 8 of this document.
- 1.12.3 Unless noted otherwise the latest editions of criteria, codes and standards referenced in UFC 4-510-1, sections 1 through 23, and identified herein, shall be used. Applicability of codes and standards that are revised during the course of design will be determined by the USACE District in coordination with CEHNC-MX and the Using Service.
- 1.12.4 For Laboratory and/or Animal Research Facility Projects, the following criteria shall also be applicable:
- a. Biosafety in Microbiological and Biomedical Laboratories (BMBL), 4<sup>th</sup> Edition, U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Institutes of Health, May 1999:  
<http://www.cdc.gov/od/ohs/biosfty/bmbl4/bmbl4toc.htm>
  - b. Guide for the Care and Use of Laboratory Animals, Institute of Laboratory Animal Research, Commission on Life sciences, National Research Council.
  - c. Occupational Health and Safety in the Care and Use of Research Animals, Committee on Occupational Safety and Health in Research Animal Facilities, Institute of Laboratory Animal Resources, Commission on Life Sciences, National Research Council.

- d. Association for the Assessment and Accreditation of Laboratory Animal Care International standards.
- 1.12.5 Deviations and waivers to criteria, codes and standards must be coordinated through CEHNC-MX for approval by TMA-PPMD in accordance with UFC 4-510-1, Section 1, paragraph 1.4.3

**End – Section 1, Administrative Requirements**

## Section 2 – Design Requirements

### 2.1 General Design Requirements.

- 2.1.1 Review Comments. Each design submittal shall incorporate all previously accepted review comments. Copies of all review comments from the previous submittal, with annotations, shall be included with each subsequent submittal. Reference these Design Instructions, Section 1.12.D for additional information on the Design Review and Checking System (DrChecks).
- 2.1.2 Metric Design. In accordance with ER 1110-345-100 <http://www.usace.army.mil/inet/usace-docs/eng-regs/er1110-345-100/entire.pdf> and Public Law 92-168, Metric Conversion Act of 1975, as amended by the Omnibus Trade and Competitiveness Act of 1988 (Public Law 100-418), all designs for new facilities shall be developed using the metric system of measurement. USACE Engineering and Construction Bulletin No. 2002-6 reiterates the policy and further makes the “design office” (USACE District) responsible for issuing specific determinations as to enforcement on a project by project basis. If justification exists to not use the metric system of measurement due to the fact that it would adversely impact the project, USACE District must document this decision and include it as part of the permanent project records.
- 2.1.3 Sustainable Design. In addition to criteria, codes and standards referenced in UFC 3-400-01, specific USACE guidance for developing sustainable building and site designs is contained in USACE TL 1110-3-491 <http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-491/toc.htm>. Features and products shall be incorporated into the design of this project, as appropriate, when determined to be economically feasible and meeting the technical requirements of the UFGS, with the goal of attaining documented equivalency to a “Bronze” rating, as a minimum.
- 2.1.3.1 If required (**EDIT AS APPROPRIATE FOR PROJECT - COORDINATE WITH LANGUAGE IN 2.1.3 ABOVE!!**), the A-E shall prepare a Sustainability Study for this project in accordance with the USACE District’s guidance. This study shall be submitted within 10 days after the Bid Opening for the construction contract or as directed by the USACE District. The Sustainability Study, updated as necessary during construction, may subsequently be used by the Installation to apply for a U.S. Green Building Council LEED certification. It is intended that the completed facility qualify for a minimum Bronze certification level as determined by the USACE Sustainable Project Rating Tool (SPiRiT) <http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-491/a-c.pdf>. The scope of this project does not include the application for a U.S. Green Building Council LEED certification.
- 2.1.4 Program For Design Deviation. Justification is required for deviations in excess of 10 percent in the net area of any individual space identified in the Program For Design (PFD), except those spaces specifically identified in UFC 4-510-01, Section 2, Figure 2-6, as having irreducible minimum areas. If, during the course of design development, there is a requirement for a greater deviation from the Program for Design (PFD), the A-E shall provide

the reason for the deviation, note who directed it, as a Note in the Net Area Tabulation referenced below. In cases where the application of UFAS/ADAAG criteria causes an increase in excess of 10 percent, the A-E shall so state, and present any associated cost impact, in the note.

2.1.5 Protection of Medical Function During Construction. (Delete if not an Addition or Alteration)

- 2.1.5.1 As applicable to the specific project, the documents shall include measures to continue utility services and free access to all areas that will remain operational during construction along with measures to safeguard all occupied areas from construction-generated hazards. When utility or service outages to occupied areas are foreseen to be necessary in accomplishing the work, the design shall determine and document in the Comprehensive Narrative the anticipated extent of such outages, and shall factor this information, in consultation with the User and the USACE, into the project phasing plan. The maximum allowable duration of utility outages and requirements for prior notice of such outages shall be described in design documents.
- 2.1.5.2 The design shall provide an appropriate level of infection control measures for areas potentially affected by construction activities, including those including or adjacent to spaces under construction, or through which construction traffic will occur. As an aid in assessing the required minimum infection control measures, the A-E shall utilize the 'Infection Control Risk Assessment Matrix of Precautions for Construction and Renovation' available from the American Society of Healthcare Engineering, at <http://www.ashe.org>. Provide for construction areas to be sealed off from occupied areas with effective dust barriers, continuous from slab to slab (with required fire ratings), with construction areas negatively pressurized and exhausted. The required means of egress maintained during construction must comply with NFPA 101. HVAC ducts, or other connecting pathways for the migration of airborne dust between construction areas and occupied areas shall also be sealed. The design shall ensure the continued availability of hand-washing stations in all patient treatment and diagnostic areas. The design shall seek to minimize heavy construction work directly within, over, or adjacent to inpatient areas that are to remain in operation, to avoid excessive noise and the disturbance of settled dust in these areas.
- 2.1.5.3 The A-E shall define restrictions on the contractor's work hours and facility access as required to minimize interference with medical research functions. The A-E will follow installation and any adjacent local governing body work restrictions and noise levels. Coordinate with the Military Installation, the User, and with the Contracting Officer to define permissible mobilization and storage areas, haul routes, construction parking, and personnel access-ways to into the construction site.
- 2.1.5.4 For each separately identifiable phase or sub-phase of the project, the design team shall evaluate the impact of work under that phase upon facility life safety, with emphasis on the following features: Minimum exiting requirements, Maintenance of critical fire and smoke barriers, Continuity of fire alarm, Operability/availability of fire suppression system. The A-E shall establish whether the work will compromise these critical life safety features to any area of the existing facility. The design shall describe and show rerouting or temporary modifications necessary to continue fire alarm and suppression systems in complete service,

when such rerouting or modification are cost feasible. Where prolonged outages of these services are anticipated, the construction team shall coordinate with the User to recommend alternative fire safety measures and shall show and describe these in the design documents. Where the work interferes with or eliminates exiting provisions from occupied areas, or building smoke/fire separations, the A-E shall recommend, and provide in the design, for alternative measures to maintain equivalent life safety for the affected areas.

- 2.1.5.5 Confirmation of Existing Conditions. The A-E shall conduct an investigation of the existing facility spaces, and equipment affected by, or affecting the work of, this project, to evaluate existing conditions and note marked deviations from the As-built drawings. The purpose of the investigation is to provide the A-E with a reasonable understanding of existing conditions and equipment, including those in concealed spaces, to permit a more accurate assessment of the required scope of work. It is not intended that the investigation lead to a detailed evaluation of the accuracy of as-built drawings, but it shall be sufficient to confirm the locations of the major utilities, and, where applicable, the feasibility of equipment room/distribution space access for equipment replacement or installation. The investigation shall include, in addition to open rooms and spaces, such concealed spaces as equipment rooms, chases, crawlspace(s), and above-ceiling locations on each floor, wing, and department, including representative locations above each corridor. When concealed spaces are not readily accessible (lacking access doors, removable ceiling panels, etc.), the A-E shall identify to the Project Manager the number and location of access points he believes are reasonably necessary to establish the necessary information, for government preparation and restoration of such access points. Significant information resulting from the investigation shall be indicated on project demolition drawings or as-built depictions as pertinent to the required construction. Requirements for hazardous material investigations, if required by other portions of these Design Instructions, shall be as detailed by those instructions.
- 2.1.5.6 Special Commissioning Considerations for Additions/Alterations. The design shall provide detailed testing requirements for all equipment and systems when required. UFGS/CEGS contain detailed testing procedures for most equipment and systems but require designer editing and augmentation for specific projects and in particular for systems which are placed in operation in stages, or by phase. In addition, the basic UFGS/CEGS do not provide adequately for integrated systems testing of such integrated systems as Emergency Power/HVAC, Fire Alarm/HVAC, and Emergency Power/Critical Mechanical Equipment, etc. The A-E shall provide complete specifications for the commissioning of all equipment and systems, including integrated systems testing and, when necessary, special instructions for commissioning systems which are completed or altered in different stages. These specifications shall provide point-by-point, detailed testing protocols and documentation/reporting requirements similar in detail to those provided under UFGS/CEGS 15951, DDC Control Systems.
- 2.1.5.7 Phasing Plan. This project may require detailed phasing plans and specifications to clearly convey the sequencing of the construction work in conjunction with continuing operation of the medical research facility during the construction period. The A-E shall establish with the User, during the final design, those medical research functions that must continue in operation during construction and shall develop a plan to phase the construction such that interference

with those functions is minimized. The final phasing plan shall take into consideration all aspects of the construction work from site mobilization through final commissioning and User training, defines the nature and sequence of work activities, under each phase or sub-phase and by discipline, and shall incorporate the necessary User moving/transition time periods. The phasing plan shall consist of phasing drawings, detailed Gantt or similar time-activity charts, and detailed written descriptions of the work, as necessary to clearly convey the required information, and shall establish a reasonable overall duration for the performance of the construction.

2.1.5.8 Design for Modifications to Existing Equipment or Systems. Any modification, adjustment, re-balancing, or re-testing/certification work required on existing systems by this project, including temporary measures necessary to relocate, maintain, or protect services or equipment, shall be shown and described in detail in the design documents. All demolition shall be clearly delineated on separate demolition drawings with points of disconnection shown. Any necessary modifications to existing systems shall be detailed in the design and the extent and impact of such modifications shall be discussed in the Comprehensive Narrative.

#### 2.1.6 Integration of Building Systems (IBS) Design.

2.1.6.1 Utility Services Distribution. IBS design considerations dictate careful consideration of the locations of equipment rooms and the routing of utility feeders in relation to the floor layout design. The design shall minimize utility distribution "choke points," particularly in above-ceiling spaces, where multiple systems cross or converge resulting in inadequate space for installation, maintenance access, and ventilation of fixtures and equipment. The length and complexity of utility distribution runs shall be minimized. Where possible, avoid routing utility feeders through areas that they do not serve, minimizing the impact and complexity of future facility modifications.

2.1.6.2 Physical Space Requirements for Equipment and Distribution Systems. Equipment space requirements, whether in equipment rooms, interstitial spaces, above-ceiling spaces, or utility chases, shall be sufficient to provide for installation, O&M, inspection, and ventilation of fixtures and equipment. For the Fact-Finding Session (Charrette) Report, estimate the worst-case utility equipment sizes (including distribution elements) as a basis for determining the architectural space requirements in accordance with UFC 4-510-01, and present this information in the Design Analysis. Reconfirm the adequacy of proposed space envelopes on subsequent submittals. Proof of concept of utility coordination will be required in the form of multidisciplinary equipment room plans and cross-sectional elevation sketches of representative congested distribution spaces (above-ceiling, typically) throughout the facility.

2.2 Commissioning. The design shall provide detailed testing requirements for all equipment and systems provided new or significantly altered under this project. UFGS contain detailed testing procedures for most equipment and systems, but require editing and augmentation for specific projects such as this, involving large-scale equipment and systems or those made complex by phased decommissioning or expansion requirements. In addition, the basic UFGS must be edited and/or augmented to provide adequately for integrated operational testing of

such inter-dependent systems as Emergency Power/HVAC; Fire Alarm and Control/Emergency Power/HVAC; Emergency Power/Critical Mechanical Equipment, etc. The A-E shall augment the UFGS or propose new specification sections, as appropriate, to provide for integrated systems testing for the systems and equipment provided in this project design. These specifications shall provide point-by-point, phase-by-phase, detailed testing protocols and documentation/reporting requirements, with expected results, to establish the minimum requirements of the Construction Contractor's Commissioning Plan. See Section 1 of these Instructions for qualifications of the Commissioning Consultant(s).

## 2.3 Design Procedure, Submittals and Documentation

- 2.3.1 Comprehensive Narrative. Each design submittal shall include a Comprehensive Narrative in accordance with UFC 4-510-1, Appendix B, paragraph B.2.8, and B.4.2, and requirements indicated in these instructions. The Comprehensive Narrative shall describe the various proposed architectural and engineering aspects of the project and shall include narratives, calculations, technical data, reports, catalog information, charts, drawings, sketches, etc. for each design discipline as required conveying the basis of design, and design intent. As medical research staff and non-design professionals will participate in the design and review of this project, it is important that, to the greatest extent possible, the Comprehensive Narrative information be presented in a manner and format permitting an understanding of the design basis, intent and fundamental aspects by persons without architectural or engineering backgrounds. The Comprehensive Narrative technical sections shall be arranged in the same order as the corresponding technical sections of UFC 4-510-01. A list of applicable criteria, with effective date, shall be provided at the beginning of each Comprehensive Narrative technical section.
- 2.3.2 Executive Summary. An Executive Summary is required for each design submittal and shall be provided in accordance with UFC 4-510-1, Appendix B, paragraph B.3.2 as a separate volume of each Comprehensive Narrative.
- 2.3.3 Submittal Requirements and Distribution Matrix (SRDM). It is anticipated that the overall design development effort will require the design submittals identified in UFC 4-510-1, Appendix B, paragraphs B.1 through B.5 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf) as modified by the SRM. The SRM is intended to assist the project delivery team members/organizations by outlining the deliverables and information required for each submittal. The SRM also indicates the number of submittal documents each project delivery team member/organization is to receive with each design submittal, as well as Confirmation Notice distribution requirements. During the Pre-negotiation Conference, Using Service and USACE representatives should enter their quantity requirements for each design submittal in the draft SRM along with their complete mailing addresses, points of contact, telephone and fax numbers, and e-mail addresses so that a final SRDM may be developed for use by the A-E.
- 2.3.4 Design Submittal Check Lists. Design Submittal Check Lists (Attachments 7a, 7b) shall be completed by the A-E, signed by a principal of the firm, and included with both Submittal S2 and the Concept Design Submittal S4.



- 2.3.5 Project Execution Schedule. The USACE, as the designated Design/Construction Agent for this project is responsible to TMA-PPMD for the execution of the project from receipt of Design Authorization through completion of construction. Adherence to scheduled milestones by the entire project delivery team is essential to successful completion of the project. The design schedule shall be in accordance with UFC 4-510-1, Section 2, paragraph 2.2.3 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf) and the Project Execution Schedule (Attachment 8). The Project Execution Schedule shows the duration of the A-E work periods and the project delivery team review periods, as well as review conference time frames, for each required design submittal. The dates shown are the start and completion dates for each event. The submittal completion date is the date the submittal documents are due in each review office.
- 2.3.6 Drawings. The design shall be developed using 3-D Computer Aided Design and Drafting (3-D CADD) in order to ensure functionality of all spaces, constructability, operability, and maintainability. Drawings will be prepared in accordance with A-E-C CADD Standards (<https://tsc.wes.army.mil/products/standards/aec/intro.asp>) and as noted herein.
- 2.3.6.1 Provide plans at a scale in accordance with Table 13 of the A-E-C CADD Standards, and as noted herein:
- All floor plans, unless noted otherwise, shall be at minimum scale 1:100 (1/8"-1')
  - Site plans at a minimum scale of 1:500 (1"-40'). 1:1000 may be used for topological or other plans when depicted information is legible with half size reduction.
  - Communication system plans at minimum scale 1:50 (1/4"-1')
  - Medical equipment floor plans at minimum scale 1:50 (1/4"-1')
  - Plans or partial plans showing equipment rooms and congested areas at minimum scale 1:50 (1/4"-1')
- Scale for details shall be suitable to provide legibility at half size reduction.
- 2.3.6.2 Partial plans shall be related in some obvious way to the overall floor plans.
- 2.3.6.3 Fonts shall be sized to be easily legible when reproduced at 1/2 size. Illegible drawings will be cause for re-submission.
- 2.3.7 Gross Area Tabulation. Gross Area Tabulation is required in accordance with UFC 4-510-1, Appendix B, paragraphs B .2.9 and B.3.7, and Figure 2-5 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf). A Gross Area Tabulation comparing as-designed gross areas with the Program For Design gross areas shall be included with both Submittal S2 and the Concept Design Submittal/Submittal S4.



- 2.3.8 Net Area Tabulation. Net Area Tabulation is required in accordance with UFC 4-510-1, Appendix B, paragraphs B.2.10 and B.3.8, and Figure 2-6 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf). A Net Area Tabulation comparing as-designed net areas with the Program For Design net areas shall be included with both Submittal S2 and the Concept Design Submittal/Submittal S4.
- 2.3.9 Net-to-Gross Area Conversion. In accordance with UFC 4-510-1, Section 2, Figure 2-6, and Appendix B, paragraph B.2.11 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf), provide Net-to-Gross area conversion tables, with dimensioned single-line plan(s). Conversion factors for this project are shown in the Program For Design (PFD). The A-E shall prepare an as-designed Net-to-Gross area conversion table, in the Program For Design (PFD) format, that compares as-designed areas for corresponding building components with the Program For Design (PFD) conversion factors for those components and accordingly provides a total comparable as-designed gross area for the project as a whole. Detailed written justification for any as-designed component area in excess of the corresponding Program For Design (PFD) conversion factor shall be included. A Net-to-Gross area conversion table, and plans, shall be provided with both Submittal S2 and the Concept Design Submittal S4.
- 2.3.10 Operation and Maintenance (O&M) Manuals and Training. O&M manuals and training are required in accordance with UFGS and these Design Instructions. The A-E shall include requirements in the individual technical specification sections to ensure that the construction contractor provides O&M manuals and training (including classes, videos, etc. as appropriate to tasks) for Using Service O&M personnel for all systems, equipment and components that will require O&M. O&M manuals shall be provided and approved before beginning training and training shall be completed prior to operation of the new facility. The A-E shall interview the Installation Engineering Authority staff, and/or medical facility Engineering Authority staff, to determine any particular training priorities and requirements. Such information shall be taken into consideration in developing the specification requirements for O&M manuals and training.
- 2.3.11 Rendering. In accordance with UFC 4-510-1, Section 2, paragraph 2.7 and Appendix B, paragraph B.4.3 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf) the A-E shall provide an original color architectural exterior rendering of the project, photographs, and slides (transparencies) of the rendering. The rendering and the photographs shall each be matted, titled, glazed and framed in accordance with UFC 4-510-01, Appendix B.4.3, Rendering. The rendering shall be provided with Submittal S5. Distribution of the original rendering and photographs shall be in accordance with the SRDM.
- 2.3.12 Submittal Register (ENG Form 4288). The A-E shall provide a construction Submittal Register in accordance with USACE District guidance.
- 2.3.13 Bid Schedule. The A-E shall provide a Bid Schedule in accordance with USACE District guidance and instructions.

- 2.3.14 Real Property Transfer Document (DD Form 1354). The A-E shall provide a Real Property Transfer Document in accordance with USACE District guidance and instructions.
- 2.3.15 Design Calculations. All design calculations shall be included in the Comprehensive Narrative for each design submittal to establish the basis of design. These calculations are subject to Using Service and USACE review. When performed by computer programs, it will be necessary to provide in the Comprehensive Narrative sufficient information on the program to enable the reviewers to establish the validity of the calculations. Information should include a description of the program's methodology; identification of the specific equipment, systems, or processes being treated; identification of all inputs and defaults; identification of all engineering units; and a clear presentation of results.

## **2.4 Master Planning and Site**

- 2.4.1 Designs shall comply with UFC 4-510-01, Section 3, Site Development, and Appendix B, paragraphs B.1, B.2, B.3, B.4, B.5 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf), and related sub-paragraphs. In addition, specific guidance concerning the National Interagency Biodefense Campus (NIBC) provided by the USACE District and the Installation shall be complied with.
- 2.4.2 The USACE District will provide the A-E with a geotechnical/foundation report for the project site, which the A-E shall use for the design.
- 2.4.3 The Installation shall provide information on sources and capacities for domestic water, electrical service, sanitary sewers, storm water drains, telephone voice service, Wide Area Data Network, television/cable TV service, security systems, mass notification systems, and other existing or new site systems/utilities available to support the project.
- 2.4.4 The A-E shall perform water flow testing in accordance with Section 2.13, Fire Protection, to establish fire protection water supply availability and capacity. Site utilities shall be evaluated during Concept Design development to verify adequacy of available capacities to support any increased demands resulting from this project and future expansion. Any changes to existing utility infrastructure beyond the project site shall be coordinated with the Installation.
- 2.5 **Architectural**. The design shall comply with UFC 4-510-01, Section 4: Architectural [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf), and related sections, any applicable Installation master plan(s), and the Installation Design Guide. The A-E shall review UFC 4-510-1 Section 1 paragraph 1.8 Design Considerations for additional guidance.
- 2.5.1 Show and identify biosurety/containment and X-ray shielding requirements for doors, floors, walls and ceilings on plans, details and schedules as necessary.
- 2.5.2 Provide an exterior color/material board (original and photographs) for exterior materials and finishes with the Concept Design Submittal/Submittal S4.

- 2.5.3 Medical/Dental (**EDIT**) planning shall be in accordance with the Program For Design (PFD), applicable criteria, and other Using Service guidance.
- 2.6 **Structural.** Design shall be in accordance with UFC 4-510-01, Section 5: Structural Design [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf) , as applicable to this project, and the USACE District's A-E guide. Confirm any special soils and structural conditions and any local codes and requirements with the USACE District.
- 2.7 **Seismic.** Design shall be in accordance with UFC 4-510-01, Section 6: Seismic Design, [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf) and the USACE District's A-E guide. If required by the SRDM, provide a Seismic Design Concept Report with the Concept Design Submittal/Submittal S4. The report shall be separate from the narrative and the executive summary. Note all requirements for anchorage, bracing, restraint and protection of non-structural building systems and installed equipment to preclude damage due to an earthquake. If applicable, note any requirements for post-earthquake operation. Confirm any special seismic conditions and any local codes and requirements with the USACE District. Refer also to special requirements under Mechanical.
- 2.8 **Energy and Water Conscious Design.** Design shall be in accordance with UFC 3-400-01, [http://www.hnd.usace.army.mil/techinfo/ufc/081602\\_UFC3-400-01.pdf](http://www.hnd.usace.army.mil/techinfo/ufc/081602_UFC3-400-01.pdf), which has superseded Section 7 of UFC 4-510-1.
- 2.9 **Heating, Ventilation and Air Conditioning (HVAC).** All HVAC, plumbing, gas, and other mechanical systems shall be designed in accordance with Appendix B of UFC 4-010-01, [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_4\\_010\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf); and UFC 4-510-01, Section 08: Heating, Ventilation, and Air-Conditioning (HVAC) and Section 09: Plumbing and Medical, [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_1191.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_1191.pdf), and these Design Instructions. In the event of criteria conflict, UFC 4-510-01 shall be considered the ruling criteria.
- 2.9.1 Systems Selection.

Selection of all major mechanical systems shall be accomplished by the A-E using energy and Life Cycle Cost Considerations in accordance with UFC 3-400-1 and these Instructions.

For designated large scope inpatient, "super clinic", or medical research facilities, as determined by CEHNC-MX and the Using Service in conjunction with the HQUSACE District Office, selection of all major mechanical systems shall be accomplished by the A-E during Concept Design development using energy and Life Cycle Cost Analysis comparisons conducted in accordance with UFC 3-400-01 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_400\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_400_01.pdf) and these instructions. During the Charrette, the AE shall discuss with the MCX and USACE District technical representatives the several most reasonable variations of energy plant equipment type, capacity, number, and configuration having the greatest potential to meet functional requirements and life cycle cost efficiency. For each major plant or system type, to include heating, steam generation (if separate from heating), building cooling, and air

handling unit/air distribution/exhaust, the PDT shall select a maximum of two to three variants for detailed engineering life cycle cost analysis as part of the S3 design development.

- 2.9.2 Control Systems. Control systems required for HVAC equipment shall be Direct Digital Control (DDC) type, in accordance with UFC 3-410-02A. <http://www.hnd.usace.army.mil/techinfo/UFC/UFC3-410-02A/UFC3-410-02A.pdf>. The A-E shall determine if the user or the installation will require remote communication between the project's DDC systems and any installation-wide Energy Monitoring and Control System (EMCS). If required, the A-E shall investigate whether the existing EMCS is capable of interface with a LONMARK based system (as per UFGS 15951), or whether a proprietary building system is required. Monitoring and control systems shall be in accordance with USACE Technical Instruction 811-12: <http://www.hnd.usace.army.mil/techinfo/ti/811-12/index.htm>.
- 2.9.3 Water Treatment. Water softening requirements shall be determined during Concept Design development based on Government analyses of the water supplies at the project site. The AE shall determine water quality requirements for medical, dental, and laboratory equipment during concept design, to determine if reagent grade or other special treatment equipment will be required. Space for such equipment, and its cost, shall be included in the concept design.
- 2.9.4 HVAC Air Balance Summary Table. Provide this table with the Concept Design Submittal/Submittal S4. See Air Balance Form for format (Attachment 11). The purpose of this table is to illustrate the air supply, return, and exhaust requirements for each space in the facility, showing the minimum and maximum air flow rates and/or air changes required to meet the ventilation, conditioning, exhaust makeup, and relative pressurization requirements established by criteria.
- 2.9.5 Seismic Design Considerations. In the event that the seismic criteria for this facility requires seismic bracing for mechanical piping systems subject to thermal expansion movement and related forces, it shall be the A-E's responsibility to design a system of seismic bracing, consisting of drawings, details, and prescriptive specifications, that simultaneously accommodates the thermal expansion features and performance of the piping. This may require modification of existing UFGS provisions, and the use of other State or Federal Government, or industrial, criteria or guidance to supplement that referenced herein, as shall be coordinated with CEHNC-MX and the USACE District Office.
- 2.9.6 Acoustics. The HVAC design shall take into consideration the noise generation by all major mechanical equipment items, to include terminal air distribution equipment, to assure that adequate attenuation features or equipment are provided to meet the individual room NC levels established by criteria. In addition to noise generation and attenuation of major energy plant equipment, an acoustical analysis of duct-borne, including breakout, noise transmission is required for each major air handling and distribution system. Where sound attenuation equipment is found to be required, the required attenuation level in each of the major octave bands shall be calculated and scheduled or specified in the design. A preliminary acoustical analysis of the distribution system noise transmission shall be completed during Concept

Design development to permit establishment of the space requirements for sound attenuating equipment.

- 2.9.7 Commissioning. The AE shall develop comprehensive, step-by-step, pre-test checklists and functional performance testing procedures for all major mechanical systems and equipment, to include interfaces to emergency power and fire alarm systems. Refer to more detailed requirements under section 2.2, Commissioning, of these Design Instructions.
- 2.9.10 Construction Phasing and Protection of Existing Facilities and Services. Requirements for phasing and facility protection are addressed for all disciplines in section 2.1.5 of these Design Instructions.
- 2.10 **Plumbing and Medical Gas.** All plumbing, and medical gas/air/vacuum systems, shall be designed in accordance with UFC 4-510-01, Section 9: Plumbing and Medical Gas and these Instructions. Applicable military Technical Manuals (TMs) and Technical Letters (TL's) provide supplementary design requirements and guidance. The ASHRAE Handbooks and Standards, International Plumbing Code, and NFPA Standards and Codes, including NFPA 99, provide minimum design standards. In the event of criteria conflict, UFC 4-510-01 shall be considered the ruling criteria.
- 2.10.1 Medical Gas Outlets. Connection style of medical gas outlets shall be in accordance with guidance from Using Service so that adapters will not be needed for connections to medical equipment.
- 2.11 **Electrical.** Electrical design shall be in accordance with UFC 4-510-01 Section 10, Electrical, and as clarified by criteria cited in these design instructions, codes and standards. Specially selected products to be incorporated into the design shall have been proven reliable, and shall have proven trouble free service for two years or longer in a similar installation environment. Provide a note on the legend sheet stating, "No aluminum conductors will be used in the construction of this facility; no aluminum buss will be used in switchboards and panel boards; and no transformers will have aluminum windings". Provide commissioning specifications, and work phasing plan as required. The power factor will be greater than 0.90.
- 2.11.1 Seismic Protection. Building electrical equipment and distribution systems shall be protected from seismic activity in accordance with the guidance provided in TI 809-4. The extent of seismic protection shall be a function of the building category, essential or non-essential, and the seismic zone in which the building is located. Confirm that design drawings and specifications for electrical systems and components are coordinated with other trades to insure structural anchorages, supports, bracing and restraints are adequate for personnel and property protection. Specification guidance shall be obtained from the Corps Guide Specification (UFGS 13080). Provide seismic bracing details on the contract drawings.
- 2.11.2 Site Power. The A-E's electrical engineer shall visit the project site and obtain field design data for all existing exterior electrical systems. Validate project power and criteria requirements, and the power source capacity available for the project. The Comprehensive Narrative shall include but not be limited to considerations for power reliability, available

unobligated capacity, and condition of the electrical distribution to the project, above and /or below grade obstructions, etc. Any necessary upgrading of electrical distribution beyond the project scope shall be identified expeditiously in order to avoid affecting project schedule and/or funds. Substation, distribution lines and equipment shall be able to serve the full design load of the facility plus a minimum 20 percent future load growth. As applicable, validate energy plant has the electrical capacity to serve the project.

- 2.11.3 General Power. Provide short-circuit and protective devices coordination studies in accordance with TM 5-811-14. Selection of protective devices and switchgear for a new electrical system shall be based on short-circuit protective device coordination analysis. The analysis shall include all existing system protective devices affected by alterations and additions to the system. All protective devices shall be properly coordinated to provide selective tripping. Do not provide series rated equipment. The coordination study shall be done using a manufacturer's actual fuse and breaker curves on full size log-log paper similar to K&E 48 5258, not a computer program. Identify any environmental conditions or special requirements, which will affect cable, power and electronic equipment selection and application. Provide at least 20 percent future load growth capacity in all new cable and electrical equipment.
- 2.11.3.1 Fall-of-potential ground testing method will be used to validate grounding. Because of the sensitivity of the equipment, it is recommended that the contractor coordinate with the user if ground resistant lower than 25 ohms is required (Per NFPA-70, Article 250). If the 5 ohm communication ground is bonded to the power ground, then the system ground resistance will be 5 ohms or less.
- 2.11.3.2 The tiebreaker of double-ended substations will be identical and interchangeable with the main feeders breakers at both ends of the substation.
- 2.11.3.3 Where sprinklers are used in high voltage and emergency power equipment rooms, the equipment will be housed in enclosures that preclude water from sprinklers entering the equipment.
- 2.11.3.4 All metering shall read and indicate true RMS values.
- 2.11.3.5 ETL 1110-3-412, "Transformer Application Guide" (<http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-412/entire.pdf>), will be utilized in the selection and application of transformers and dielectrics. The windings of all new transformers will be copper.
- 2.11.3.6 Power circuits serving workstations shall be sized to accommodate personal computer equipment at each workstation. Drawings will indicate which circuits will serve nonlinear loads such as electronic and computer equipment. Provide larger or multiple neutrals to accommodate the resulting harmonic currents (see USACE ETL 1110-3-403). Uninterruptible Power Supplies (UPS) or other power conditioning equipment will be procured along with the computer or process equipment requiring no break or conditioned power. Each LAN workstation outlet will be provided with an additional well-defined adjacent duplex receptacle on an independent single phase (20 ampere, 120 volt) circuit



having not more than four duplex receptacles and a non-shared neutral. Where a 20 ampere, 120 volt receptacle is incorporated in the same metal box with a television, or LAN outlet, a partitioned metal box with separate power and signal conduits will be provided. Provide independent circuits for FAX and copy equipment, and laser printers. Coordinate their location with the users. Receptacles in crawlspaces and shops shall be GFCI protection. Recommend class A GFCI protection. Provide at least 25 percent spare spaces and 20% future load growth capacity in each panel board and switchboard.

- 2.11.3.7 Provide a motor schedule, which identifies the load, voltage, horsepower, full load current, and the service factor. The service factor (SF) should be not less than 1.15 for motors, which are accessible for repair and/or replacement.
- 2.11.4 Emergency Power. Evaluate the need for emergency power and identify the specific requirements. If emergency power is required, provide diesel engine generator sets and provide isolation-bypass switch feature for all automatic transfer switches unless otherwise directed. The alternate power system will be designed and installed as a separately derived power system using 4 pole ATSS for 4 wire systems. The design will include the life safety branch, critical branch, and equipment branch load prioritization schedules which will set the sequence that the automatic (with manual overrides) load shedding and shifting controller will manage for the emergency power system. The specifications' site testing paragraph will be modified to incorporate the normal and emergency system operational test, which will include the operational load and sequence testing of the prioritization controller. The diesel engine generator sets will not be sized to carry the total project AC load, but only the critical areas defined in the mechanical design. When two or more generators are used in parallel each generator will have the capacity to serve the Life Safety and Critical branch loads.
- 2.11.5 Nonlinear Load Requirements. Validate nonlinear load requirements and incorporate this into the sizing of all electrical equipment and conductors, and identify the multiplier for equipment and building wire size. Drawings shall indicate which circuits will serve nonlinear loads such as electronic and computer equipment. Provide larger or multiple neutrals to accommodate the resulting harmonic currents. For those areas with high nonlinear load, "K" factor rated transformers are required. Provide a transformer schedule, which identifies the "K" factor, primary and secondary voltage, and kva ratings.
- 2.11.6 Lightning Protection. Perform a lightning risk assessment per NFPA-780 Appendix I and TM 5-811-3 (<http://www.usace.army.mil/inet/usace-docs/armytm/tm5-811-3/>). If a lightning protection system is required, the system shall be a UL Master Labeled system.
- 2.11.7 Lighting. Lighting design shall conform to UFC 4-510-1 and "Graphics Figures and Tables" and the latest version of HQUSACE Standard Detail No. 40-06-04 and changes there to, "Lighting Fixtures", and EI16E500, "Lighting Design," shall be used where applicable. Specially selected design products shall have been proven reliable, primarily as shown by successful commercial service for greater than two years. Lighting intensity Lux (foot-candle) levels shall be in compliance with appendix "A" of UFC4-510-01 and general guidance provided by the Illumination Engineering Society (IES) Lighting Handbook. The light Lux

(foot-candle) levels for exterior areas not listed in UFC 4-510-01 or STD DET 40-06-04 shall be in accordance with the IES Lighting Handbook.

- 2.11.7.1 Interior Lighting System. Illumination should generally be provided with fluorescent luminaries. Incandescent and high discharge (HID) fixtures may be used in special areas or for design reasons. Lighting Fixture Guide Plates and Standard Detail 40-06-04 shall be used to the extent possible in the design. Where the latter does not provide the desired fixture type, commercial standard fixtures and/or custom light fixtures may be used. Provide a standard fixture guide plate in the contract documents for all fixtures used.
- 2.11.7.2 Lamps. Fluorescent lamps should be F32T8, cool white equivalent for administrative and class room areas, 32 watts energy saving types with a temperature of 4100K and a minimum CRI of 82. Color improved fluorescent lamps shall be used in required areas to provide enhanced color rendering and high efficiency with a temperature of 5000K and a Color Rendition Index (CRI) of 86 or better. For areas where electronic ballast is a concern (Operating, Surgical Delivery, and Labor and Delivery Rooms, etc.) and electromagnetic ballast are used, the fluorescent lamps shall be color improved with a 90 CRI and a temperature of 5000K. HID lamps shall be high-pressure sodium with dual restrike elements.
- 2.11.7.3 Fixtures. Light fixtures are generally specified for 277-volt operation, except certain incandescent lighting fixtures shall be rated for 120-volt operation. Fluorescent ballasts shall be high power factor, electronic, energy saver type. Inverter frequency shall be at the level and frequency range as not to interfere with operations, calibration of equipment and communications. The nonlinear load generated by the switch-mode power supply will not exceed 10 percent of the fundamental current. Reference ETL 1110-3-441.
- 2.11.7.4 Energy efficient design considerations shall include use of efficient lamps and luminaries, automatic lighting control, and other alternatives, which meet the reliability, durability, and maintainability requirements of the mission. Utility areas may use low cost low efficiency lighting where justified by low usage and by some automatic shut off such as door switches. Natural day lighting should be used where feasible and economical. Electronic ballasts are not recommended where the ambient temperature for any reason could exceed 104 degrees Fahrenheit.
- 2.11.7.5 Life safety egress illumination will include 25 percent of corridor and 50 percent of stairway illumination, plus 25 percent of assembly areas such as conference/class rooms. All electrical, communication and mechanical rooms shall have emergency lighting.
- 2.11.7.6 Recessed light fixtures will be supported from the structure. Include a typical support detail on the contract drawings.
- 2.11.8 Interior Illumination. Illumination levels shall meet the requirements in appendix "A" of UFC 4-510-01 and the Illumination Engineering Society (IES) Lighting Handbook. General illumination typically shall not exceed 500 Lux (50 foot candles (FC)) in administrative areas, 300 Lux (30 FC) in work areas (electrical and mechanical rooms), 500Lux (50FC) in



communication rooms and 100 Lux (10 FC) in non-work areas. Illumination in utility tunnels shall be designed for 10 Lux (1 FC).

- 2.11.8.1 Interior Lighting Fixture Types. General offices, service corridors and general purpose areas shall typically have 2X4 recessed fluorescent troffers with virgin acrylic prismatic lenses and two to four lamps per fixture, except to match existing ceiling types and fixtures in areas being altered. Offices, laboratories and areas with numerous personal computer (PC) workstations and/or video display units shall have low glare and low brightness type luminaries to reduce reflected images on the PC screens and to improve visual comfort. Small storage rooms, mechanical rooms, electrical rooms, and communication rooms shall have 1X4 surface or pendant mounted fluorescent luminaries with wrap-around virgin acrylic lenses 2 lamps per fixture. Conference rooms and/or class rooms shall be provided with multi-level lighting consisting of 2X4 recessed fluorescent fixtures and recessed incandescent down lights controlled by dimmer switched. LED exit fixtures may be used and shall meet the performance requirements in ETL 1110-3-432. Provide a manufacturers certification with each type of exit sign. High Intensity Discharge (HID) luminaries shall be used in areas with high ceilings and open construction.
- 2.11.8.2 Interior Controls. Switching of light fixtures in rooms shall typically consist of a single on-off switch adjacent to the entrance, which controls all general room lighting. Multiple switching shall be provided in large rooms and areas to allow switching of individual zones or areas. Each zone shall be provided with a separate switch. Multiple switching shall also be provided for light fixtures with two ballasts. One switch shall control the outer lamps and the other switch shall control the inner lamps. Separate dimmer controls shall be provided for rooms with dimming ballast or incandescent fixtures that are required to be dimmed. Timer switches shall be provided in rooms with infrequent use, such as janitor closets, equipment storage rooms and public toilets. Special areas such as entries and lobbies shall be switched through lighting control panels. Lighting control panels shall also interfaced with the building management system (BMS) for programmed time control or override of photoelectric controls.
- 2.11.9 Exterior Lighting Systems. Exterior lighting shall be provided for the safety of the staff and visitors. If required lighting fixtures shall be provided along the site roadway, along pedestrian walkways and in parking lots. Site lighting feeders will be routed underground and the fixtures will match the existing, as applicable to project. Emergency department designation signs shall be internally illuminated. Where exterior lighting is required for personnel and facility security, the need for emergency power backup will be evaluated.
- 2.11.9.1 Exterior Illumination Levels. Site illumination levels shall be in accordance with the recommended levels of the Illumination Engineering Society (IES) for the various types of roadways and areas.
- 2.11.9.2 Exterior Lighting Fixtures Types. Pole-mounted fixtures shall provide roadways, parking lots and walkway illumination with HPS lamps. Lamps with dual restrike elements shall be provided for safety concerns. Wall mounted fixtures with HPS lamps shall be located at each

ground level entry / exit door to provide egress lighting to the walkways for security or safety purposes only.

2.11.9.3 **Exterior Controls.** Exterior lighting shall be switched through a number of site lighting control panels, located in geographical areas of the site. The lighting control panel(s) shall interface with the building management system (BMS) for programmed time control or override of the photoelectric controls for special events or testing.

2.11.9.4 **Cathodic Protection.** Provide cathodic protection for fire protection, water, and gas force mains and miscellaneous metals.

2.12 **Communications.** Unless noted otherwise, communications systems design shall be in accordance with UFC 4-510-01, Section 11: Communications, ANSI/EIA/TIA 758, 568A, 569, and 606, as applicable to the Using Service.

2.12.1 **Systems Design.** The CSE shall design all of the required communications systems in lieu of involvement with only selected systems. This effort shall include preparation of the Design Analyses and drawings during Concept Design development and the Design Analyses, drawings and specifications during final design/construction document development, and review of cost estimates.

2.12.2 **Design Analysis.** The CSE shall ensure that all of the communication systems are described in great detail in the Design Analysis. The Design Analysis shall also serve as a document for the design history of the communications systems. This effort shall begin with the first design submittal and the systems descriptions shall continue to be elaborated/expanded through all subsequent design submittals. The Design Analysis shall document all design directives given to the CSE, as well as all major decisions by the CSE regarding the design of the communications systems. Particular attention shall be given to this area to ensure the Design Analysis provides a complete detailed narrative on the scope, equipment, function, operation, and design history of each system. The Design Analysis shall serve as the basic document against which the design shown on the Drawings and in the Specifications is checked. The Communications Systems Engineering consultant or qualified A-E in-house designer shall first ensure the Design Analysis is accurate and then shall coordinate the Drawings and Specifications with this document.

2.12.3 **Medical Telecommunications Consultant.** The CSE shall be responsible for all aspects of the communications systems design.

2.12.4 **Communications Cost Estimates.** The CSE shall ensure the initial cost estimates include cost data for all of the communications systems. Backup data shall be in sufficient detail to allow for a complete review of the summary figures provided.

2.12.5 **Telephone System.** The CSE shall perform an investigation of the existing telephone switching system for expansion capacity to serve the project facility. The investigation shall also verify the capability of the existing outside plant copper and fiber optic cables and manhole and duct-bank distribution system to support the project. Any required expansion of

the telephone switching system and or outside plant cable and or duct-bank system shall be identified. The study shall propose a solution for providing telephone-switching service for the project. Results of the survey shall be included in the Design Analysis and shall include data on the telephone switch proposed to provide service. This shall include manufacturer, model, capacity, software load and whether the installed hardware and software has sufficient capacity to support the project. All required hardware and software expansion work shall be identified and cost data shall be included in the DA and the project estimate. Any required telephone switching system expansion work that will not be included in the construction contract will be done under a separate GFGI contract. Final design shall be coordinated with the installation communications staff to assure that any and all ongoing and or scheduled work at the installation will not adversely impact the level of service required for the project.

- 2.12.6 Installation-wide Area Network. The CSE shall investigate the existing installation-wide area network connection and determine its capacity to serve the project. A proposed solution shall be discussed in the DA and include all cost data for any outside plant work that may be required. This shall include the location of the nearest point and the cable path required for the connection. The required media and any in-place assets that may be used by the project to achieve the connection shall be identified.
- 2.12.7 Premises Distribution System (PDS). The CSE shall design the PDS for this facility. The PDS shall consist of cable, outlets, terminal blocks, backboards and patch panels for voice and data networks. The PDS shall include both copper and fiber optic cables. The outlet at each workstation shall include connectors for both voice and data terminals. The voice and data connections shall be identical and interchangeable in all aspects. One four pair Category 6 rated or higher UTP cable shall serve every voice and or data outlet. The cable shall be terminated in the communications rooms on rack mounted modular patch panels. All connections shall be rated Category 6 or higher. All fiber optic data cables shall be terminated on rack mounted patch panels in the communications rooms. The fiber optic data backbone shall consist of 24 strands of multimode fiber and 12 strands of single mode fiber connecting all communications closets together. The CSE shall insure that all UTP outlet jacks and terminations are rated at the same category or higher as the connected cable. Fiber optic cable shall be used to connect all of the communications rooms, and the service entrance room to the computer room using a star-wiring pattern. Fiber optic cable shall be used to connect the facility to the installation-wide data network. Voice backbone cable shall be category 3 rated and shall be terminated on insulation displacement connectors on the back of rack mounted modular patch panels. All electronic cables shall be plenum rated.
- 2.12.8 Public Address (PA) and Paging System

For Addition-Alteration Projects, a PA system shall be provided for both the new and renovated areas of the facility. The CSE shall investigate any existing system for expansion and modification to serve the new and renovated areas. The results of the investigation shall be included in the DA. The A-E shall report their plan for providing PA service to the new and renovated areas integrated with the rest of the existing facility. The system shall be a zoned with zoning based on functional areas. It shall include an ALL CALL function for the entire facility to include existing, new and renovated areas. It shall include background music

capability, if desired by the Using Service, furnished from an FM radio and/or a CD changer or other digital music storage and playback device. Paging input source shall be from a microphone, if desired by the Using Service, and dial access from facility telephones. Zone selection and telephone interface equipment shall be part of the PA system vice the telephone system and use of trunk access circuits is recommended.

For new stand-alone construction projects, a PA system shall be provided for the facility. The system shall be zoned with zoning based on functional areas. The system shall include an All Call zone. Background music capability shall be provided if desired by the using service. The sources for background music can be FM radio, CD changer or other digital music storage and playback device. Input to the PA system shall be via dial up telephone connection and if desired by the using service microphone stations at designated locations. Zone selection and telephone interface equipment shall be part of the PA system and not the telephone system. The use of trunk circuits is recommended.

#### **2.12.9 Nurse Call Systems. INSERT NEEDED FOR MASTER**

**2.12.10 Intercom System.** All intercom requirements shall be provided via the telephone system. The only exceptions to this are the dedicated intercoms in laboratory areas that may include observation rooms with one-way glass viewing windows.

**2.12.11 Duress System.** Infrastructure support for a Duress Alarm System, if required by the using service shall be provided. This system shall consist of outlet boxes with blank cover plates, and conduit to cable trays with pull wires. The specific requirements for the Duress System will be as directed by the Using Service. The CSE shall design the conduit and back box system based on actual sensor types required to meet user needs.

#### **2.12.12 Radio Paging System.**

For new, stand-alone projects, provide a customer owned and operated radio page system for the entire facility. The system shall be capable of alphanumeric text paging to receivers with multiple levels of priority and alert tones and vibration. The system shall be capable of accepting inputs from the nurse call system, security system, telephone system and a local radio page console. The system shall also be capable of connecting to a RCC under contract to the facility for wide area pages. The primary focus of the system will be the facility; any coverage outside the facility shall be incidental. The system shall provide 100% coverage of the entire facility.

For addition-alteration projects, the CSE shall investigate any existing radio page system in the existing facility for expansion and reuse. The investigation shall evaluate the existing coverage inside the existing facility, the ability of the existing system to provide coverage to new and renovated areas of the facility, make, model, age and condition of the existing equipment. The results of this investigation shall be included in the design narrative. The CSE shall make a recommendation on the reuse, modification of the existing system or replacement of the existing system. The final design of the system shall provide a customer owned and operated radio page system for the entire facility. The system shall be capable of

alphanumeric text paging to receivers with multiple levels of priority and alert tones and vibration. The system shall be capable of accepting inputs from the nurse call system, security system, telephone system and a local radio page console. The system shall also be capable of connecting to a RCC under contract to the facility for wide area pages. The primary focus of the system will be the facility; any coverage outside the facility shall be incidental. The system shall provide 100% coverage of the entire facility

#### 2.12.13 Entertainment and Training Television (ETTV) System.

For Addition-Alteration projects, the CSE shall investigate the existing EETV system in the facility for expansion to the new and renovated areas. The investigation shall include the signal source, signal level, system ownership, and head end design. The CSE shall based on the results of the investigation propose a plan for extending the existing systems to the new and renovated areas. The investigation shall also include the proposed method for providing educational programming. Each conference room shall have TV outlets that are set up with means for connecting external sources (VCR, DVD etc.) to the television sets.

For new, stand-alone projects which do not include inpatient facilities, provide an ETTV system in the facility in accordance with the requirements of section 11 of UFC 4-510-01. The system shall provide for the distribution of television signals from a signal source to outlets located throughout the facility. Each conference room shall have TV outlets that are set up with means for connecting external sources (VCR, DVD etc.) to the television sets.

For new, stand-alone projects including inpatient facilities, provide a computer controlled EETV system in the facility in accordance with the requirements of section 11 of UFC 4-510-01. This system shall be capable of distributing television signals to system outlets in the facility, controlling the television sets connected to the system, receiving signals on the status of the television sets connected to the system, providing video on demand services, and the creation and distribution of programming. The system will be connected to a commercial source for entertainment programming. Each conference room and other areas designated by the using service shall have TV outlets that are set up with means for connecting external sources (VCR, DVD etc.) to the television sets.

2.12.14 Central Dictation. The CSE shall include in the design documents all necessary support to install a GFGI Central Dictation System if required by the using service.

#### 2.12.15 Access Control System.

For Addition-Alteration projects, the CSE shall investigate to determine if there is an existing door access control system in the facility. The CSE shall coordinate with the using service to develop and provide a door access control system in the new and renovated areas. The CSE shall report the proposed means of providing a door access system. This could be a new system or an expansion of an existing system. If a new system is provided it shall be compatible with any existing installation wide system if acceptable to the using service. Close

coordination with the using service on specific interior and exterior doors and interior areas to be controlled will be required. Associated door hardware latching and position sensor requirements shall be coordinated by the CSE with the A-E architectural designer.

For new stand-alone facilities, provide an Access Control System for selected interior and exterior doors in the new facility. The system shall be compatible with any existing installation wide system if acceptable to the using service. Close coordination with the using service shall be required to determine the quantity of doors and the specific doors to be controlled. The system shall include the capability to manufacture cards, alter access permits of specific users, and generate reports of system activity. Associated door hardware latching and position sensor requirements shall be coordinated by the CSE with the A-E architectural designer.

2.12.16 Infant Security System. **INSERT FOR MASTER**

2.12.17 Intrusion Detection System (IDS). A system of empty conduit and back-boxes will be designed to support the installation of an IDS. The CSE shall investigate the installation's existing alarm and detection system and ensure that a tie-in point will be provided to the installation IDS. The CSE shall coordinate with USAHFPA to determine the areas to be protected. The CSE shall ensure that appropriate utility support and space are provided to support the GFGI IDS.

2.12.18 EMS Radio System. The CSE shall investigate and determine if this project will require the relocation of existing EMS radios or the installation of new EMS radios. If EMS radio work is required then the CSE shall provide a design to include all necessary utility support, cable pathways, antenna mounting and physical space for a GFGI EMS radio system.

2.12.19 EMS Recorder System. EMS recorder systems are only required in facilities with Emergency rooms and or EMS radios. The system shall record both sides of all conversations from designated EMS radios and telephone sets. The system shall be capable of searching the recording for a particular time slot for play back. The system shall be capable of playing back a recording while recording an active conversation. The System shall be capable of out putting selected recording onto digital media for replay at alternate locations. The system shall be capable of continuously recording conversations simultaneously on all designated radio and telephone sets for a minimum of 24 hours. The CSE shall investigate and determine if this project will require the relocation of an existing EMS recorder or new installation of an EMS Recorder System. If an EMS recorder system is required, the CSE shall provide a design for the EMS recorder system to include all necessary utility support, cable pathways, and physical space for a GFGI EMS recorder system.

2.12.20 Physiological Monitoring System. An empty conduit and back-box system with pull wires shall be provided for the installation of a GFGI Physiological Monitoring system in accordance with the UFC 4-510-01, Section 11: Communications. The CSE shall determine if this system is required by coordinating the requirements in UFC 4-510-01, Section 11: Communications with the Using Service.

2.12.21 Closed Circuit Television (CCTV) A system of empty conduit and back-boxes shall be provided for a future GFGI CCTV system if desired by the using military service. The CSE shall coordinate locations to be monitored with the Using Service. The system is to include space allocation for monitoring or, if the system is to be monitored at a remote location, connection media is to be reserved. All utility support is to be provided as part of the project.

2.12.22 Radio Transponder System. The CSE shall investigate the use of portable radios by installation personnel inside the new and renovated areas of the facility. This investigation shall determine the types of radios used and the frequencies of operation. A means of providing 100 percent coverage for these radio systems shall be provided to ensure that they will be able to communicate with each other both inside the facility and with their network outside the facility. The CSE shall propose a solution early on in the DA to provide this service, if required, by the using military service. This system shall be coordinated with the radio page system if the frequencies allow the use of a single system.

2.12.23 Cable Tray. Cable trays shall be furnished as the primary wire-way for the communications systems in any IBS area. Cable trays shall be trough type per *NEMA VE-1* and sized for maximum 40% fill. Spacers shall be provided in all cable trays to separate the different types and functions of cable. Conduits shall connect the individual communications outlets to the cable trays. An efficient method of collecting these conduits and penetrating any walk-on deck shall be designed. The use of J hooks or similar means of cable support is not allowed. All installed cable shall be in either conduit or cable tray. Particular attention shall be paid to areas where the cable tray must change direction or elevation to provide for the proper sweep and water fall sections to allow for proper cable support. The cable tray system shall comply with the requirements of ANSI/TIA/EIA 569A.

2.12.24 Communications Rooms. Design of these spaces shall be per *ANSI/EIA/TIA 569A*. The quantity and size of communications rooms shall meet the requirements of ANSI/TIA/EIA 569A. If there is a discrepancy between the PFD and the ANSI/TIA/EIA 569A requirements then the ANSI/TIA/EIA 569A requirements shall take precedence. The rooms will be used to install all of the equipment and wiring terminations for the PDS and the GFGI equipment and racks for the LAN data systems. Minimum size of the rooms shall be 10 square meters (110 square feet). The minimum dimension for any wall is 2.5 meters (8 feet) long. The CSE and A-E shall pay particular close attention to the requirements in *ANSI/EIA/TIA 569A* for utility support, finishes and restrictions on the use of the spaces by other utilities. Centrally locate the closets in the areas that they serve and stack them vertically in a multi-story facility. To avoid excessive above-ceiling equipment congestion, communications rooms should be located away from mechanical and electrical rooms.

2.12.25 Letter Of Intent (LOI). The USACE District Project Manager will develop the LOI for communications systems such as the example that can be found at: (<http://www.hq.usace.army.mil/cemp/MDCTW/Docs/LOI%20Example.doc>). The LOI will document the responsibilities of all agencies and offices involved with providing communications services for the project. These agencies and offices will consist of the following as a minimum: CEHNC-MX (including the Communications Engineer), USACE District (including the Project Manager and engineering staff), the Using Service agency

responsible for programming functional criteria, the Installation Directorate of Information Management, A-E, and the construction contractor.

-- The LOI will be concerned primarily with telephone service, but it can include any other type of service such as cable television, where there is agreement between the USACE and the Installation as to how such service is to be provided. The LOI as a minimum will define how telephone service, and any other type of communication service, is to be provided to the project via the Installation manhole and duct-bank infrastructure and how and where telephone-switching services are to be provided. The LOI will define the agency or office financially responsible as well as the agency or office that is to execute each portion of the work. The LOI will at a minimum include the following paragraphs and sections:

-- A discussion of the existing condition of communications services on the Installation and the capability to provide the new service requirements for the project.

-- A description of the responsibilities of each agency and office involved in providing communications services for the project. These responsibilities will be covered in separate paragraphs.

-- A list of Points-of-Contact for all agencies and offices involved in providing communications services for the project. Include name, title, address, office phone number, and email address.

-- A signature page with a space for each representative of each agency and office to sign.

2.13 **Accessibility**. This project shall be designed in accordance with the requirements of UFC 4-510-01, Section 12: Accessibility Provisions for the Disabled shall be in full compliance with both the Uniform Federal Accessibility Standards (UFAS) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG) <http://www.access-board.gov/ada-aba.htm>. The more stringent of the two documents shall apply in all situations. The A-E shall attempt to design within the approved Program For Design areas. If additional areas are required to comply with UFAS/ADAAG, such areas shall be identified and explained in the Net Area Tabulation as required by 2.1.4, Program For Design Deviation herein.

2.13.1 The A-E shall provide written certification that this design complies with UFAS/ADAAG. In the case of high containment areas such as BSL4, and possibly even BSL3 laboratories, where all personnel are required to meet physically able-bodied criteria to ensure biosurety and safety, the AE will document the requirements so a waiver can be obtained for such areas, as may be required.

2.13.2 Written interpretations of UFAS by the Architectural and Transportation Barriers Compliance Board are included in UFC 4-510-01, Appendix D in an effort to answer questions that may arise during design development.

## 2.14 **Fire Protection**



- 2.14.1 **Criteria.** All building construction, life safety and fire protection systems shall be designed in accordance with the requirements given in UFC 4-510-01, Section 13: Fire Protection and related sections, UFC 3-600-01 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf), the National Fire Codes, and other governmental and industry design regulations, manuals, and guidelines as cited in those documents or in these Design Instructions. Applicable military Technical Manuals (TMs) and Technical Letters (TLs) provide supplementary design requirements and guidance. In the event of criteria conflict, UFC 4-510-01 shall be considered the ruling criteria.
- 2.14.2 **Fire Protection Comprehensive Narrative.** The Comprehensive Narrative shall individually address replacement, altered and renovated areas. All provisions pertaining to building construction and fire protection and life safety systems shall be addressed. Exposure protection, building separation, type of construction, height and fire area limitations shall be in accordance with UFC 3-600-01 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf). All fire protection and life safety systems shall be described in explicit detail, beginning with Submittal S2 and expanded and elaborated through the final design Backcheck Submittal. The Comprehensive Narrative shall provide a complete detailed narrative covering the scope, equipment, function, operation and interface of each system. The Comprehensive Narrative shall serve as the basic document against which the design shown on the drawings and in the specifications is checked. The Comprehensive Narrative shall be accurate at each design phase and coordinated with the drawings and specifications.
- 2.14.3 **Renovation and Alteration of Existing Areas and Facilities.** To the extent possible, alteration, renovation, modernization and rehabilitation work of existing facilities shall comply with the requirements for NEW construction in accordance with UFC 3-600-01 ([http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf)). Additions shall be separated by 2-hour fire resistive construction from any existing structure that is not in compliance with current codes and standards. No additions, alteration or modernization project shall lessen the fire/life safety of the existing building.
- 2.14.3.1 **Fire Protection Surveys.** Results of the following surveys shall be included in the Comprehensive Narrative. Existing areas shall comply with the requirements for new construction of UFC 4-510-01 and UFC 3-600-01 ([http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf)).
- a. **Building Code and Construction Survey.** Perform a Building Construction survey for existing facilities where there is no documentation on the construction type of the existing facility. The survey shall determine the existing type of construction, per IBC classifications, for all altered areas of the facility. The fire resistance rating for each construction element shall be determined for each construction classification identified. The survey shall address construction separation requirements where more than one construction classification is identified.
  - b. **Fire Protection Systems Survey.** Evaluate the existing fire protection systems for assessment of performance capability, including reliability and expansion to the altered or added area. Existing fire protection systems include all extinguishing systems and water

supplies, fire detection and alarm systems, smoke control features and building system controls. Where existing systems are expanded, ensure that additional equipment is compatible with existing equipment.

c. Life Safety Assessment Survey. Conduct a Life Safety Code (NFPA 101) survey of the existing area affected by the scope of the alteration and/or addition. Identify all features that do not comply with the requirements of NFPA 101. Include an evaluation of the existing fire evacuation procedures. The survey shall determine the level of additional work required to meet the requirements of the applicable criteria and shall be coordinated with the functional modifications of the facility. If available, the A-E shall obtain a copy of the current Statement of Conditions for the existing facility.

2.14.3.2 Statement of Conditions. A Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Statement of Conditions (SOC)

[http://www.jcaho.org/accredited+organizations/office+based+surgery/standards/0504\\_soc.pdf](http://www.jcaho.org/accredited+organizations/office+based+surgery/standards/0504_soc.pdf) is required for projects involving alterations and/or additions. The information required is to be documented by the A-E (using the JCAHO SOC format) in a document re-titled "Statement of Design Conditions" (SODC). A draft SODC document shall be submitted at the completion of Submittal S6 review conference and an updated SODC shall be submitted with the Backcheck Submittal. The final SOC shall be submitted at the completion of construction.

2.14.3.3 At the completion of construction the A-E is required to perform a Life Safety Assessment as well as providing the JCAHO Statement of Conditions (SOC), using the most recent JCAHO format

[http://www.jcaho.org/accredited+organizations/office+based+surgery/standards/0504\\_soc.pdf](http://www.jcaho.org/accredited+organizations/office+based+surgery/standards/0504_soc.pdf)

2.14.4 Specific fire protection requirements.

2.14.4.1 Extinguishing System. Provide complete automatic sprinkler protection as required. Where required throughout the facility, indicate all sprinkler feed mains, cross-mains, and hazard classifications (i.e., light, ordinary group 1, 2 or 3, etc.) with design densities for each section of the building indicated on the drawings. Components of fire protection water supply and distribution systems (hydrants, pumps, tanks, pipe, valves, etc.) shall meet NFPA specifications except as modified by UFC 3-600-01

[http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf). Design of the system shall be coordinated with the zoning and configuration of the proposed smoke compartmentation resulting from the fire protection/life safety analysis. The sprinkler system design shall be coordinated with the standpipe system design, if applicable. If a standpipe system is required, provide a combination sprinkler/standpipe system. Sprinkler system design shall be in accordance with NFPA 13 except water demand; design area and design density shall meet requirements of UFC 3-600-01. A performance specification(s) may be provided for construction contractor design of the required automatic sprinkler protection for the new facility.

a. Provide existing water flow information, including static and residual pressures with

available flow (L/s) in the Comprehensive Narrative and sprinkler system specifications. The A-E shall perform water flow testing and provide the test report and calculations in accordance with NFPA 291 and UFC 3-600-01

[http://www.wbdg.org/ccb/DOD/UFC/ufc\\_3\\_600\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_3_600_01.pdf). Include results in the Comprehensive Narrative for the Concept Design Submittal/Submittal S4. Test results must not be older than 180 calendar days. Water flow information shall include actual test data and conversions. In addition to a brief description of the test data and calculations, information shall include a hydraulic graph and a sketch of each water flow test with hydrant identification, pipe and opening size, etc., and location in relation to the project site and the new facility.

b. Provide preliminary hydraulic calculations to demonstrate that the fire extinguishing system(s) design will provide an adequate water supply to support the fire flow demand.

#### 2.14.4.2 Fire Detection and Alarm System (FDAS).

a. All new equipment, devices, wiring and conduit shall conform to NFPA 70, NFPA 72 and NFPA 90A. Alarm signaling devices shall be both audible and visual type. Visual alarm devices shall be located throughout all common use spaces such as corridors, lobbies, lounges, public bathrooms, examination and treatment rooms as well as mechanical and generator rooms. Visual alarms are not required in areas that are used only by staff as workrooms (individual offices and work stations). Visual alarms are also not required in specific rooms (i.e., examination and treatment rooms) that are accessible to patients, but are under the control and supervision of trained staff. Manual pull stations shall be handicapped accessible.

b. The FDAS shall be connected to the local fire department per NFPA 72 or be centrally supervised at a remote location. System design shall be coordinated with the zoning and configuration of the smoke compartmentation. Performance and capacity of system circuits shall be in accordance with UFGS-13850A, <http://www.ccb.org/docs/ufgshome/pdf/13850A.pdf>, Fire Detection and Alarm System, Direct Current Loop or UFGS-13851A, Fire Detection and Alarm System, Addressable.

2.14.4.3 Fixed Halon extinguishing systems shall not be provided. Protection of electronic equipment installations such as telephone switchgear (EPABX) rooms and computer rooms shall be provided with smoke detection and an automatic wet-pipe sprinkler system.

2.14.4.4 Mass Notification System. A mass notification system shall be provided in accordance with UFC 4-021-01 (<http://www.hnd.usace.army.mil/techinfo/UFC/UFC4-021-01.pdf>).

2.15 **Physical Security**. Security design shall be in accordance with UFC 4-510-01, Section 14: Physical Security as applicable to this project. Refer to Section 2.11.17, Intrusion Detection System (IDS) provisions herein.

- 2.16 **Force Protection.** The project shall be designed to comply with the minimum Antiterrorism Force Protection (ATFP) standards established by UFC 4-010-01 [http://www.wbdg.org/ccb/DOD/UFC/ufc\\_4\\_010\\_01.pdf](http://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf) and, if applicable, UFC 4-010-02 (FOUO), as well as any additional ATFP requirements as identified by the Using Service, USACE District and/or the installation, including requirements for protection against specific threats. A Mass Notification System is required as discussed in Section 2.14 of this document.
- 2.17 **Medical and Dental Equipment.** Equipment and casework design shall be in accordance with UFC 4-510-01, Section 16: Medical and Dental Equipment and in accordance with laboratory criteria provided by the Using Service. The Using Service will provide a Medical Equipment List and Medical Design Guide Plates for reference and use during Concept Design development. The list will include both new equipment items and any existing equipment items to be relocated. The Using Service and A-E will jointly determine which existing items, if any, will be relocated by the construction contractor and which existing items, if any, will be relocated by the medical treatment facility. The Medical Equipment List shall be included in Submittal S2.
- 2.17.1 The Concept Design Submittal/Submittal S4 and each final design submittal shall include a complete room-by-room Equipment and Casework Schedule identifying the Logistics Category (Log Cat) <http://www.hq.usace.army.mil/cemp/MDCTW/Docs/LOG-CAT.doc> of each equipment and casework item. Include all Log Cat A, B, E, F and G items and any Log Cat C items requiring unique utilities and/or structural support. Include utility requirements. An Equipment and Casework Schedule format is found at Attachment 12a.
- 2.17.2 The A-E shall complete Sections I.a. through I.h., and Sections III.a., III.c., and III.e., of the Facilities Survey Report for Installation of X-Ray Systems ([Attachment 13](#)), to assist the Using Service with radiology equipment acquisition. The construction contractor shall be required to provide the remaining information. This information is normally provided throughout various parts of the design documents and is to be consolidated on this form.
- 2.18 **Transportation and Materials Handling Systems.** Design for Transportation and Materials Handling Systems shall be in accordance with UFC 4-510-1, Section 17 as applicable to specific projects.
- 2.19 **Waste Management.** Design for waste management and disposal shall be in accordance with UFC 4-510-01, Section 18: Waste Management as applicable to specific projects.
- 2.20 **Integrated Building Systems.** IBS design shall be in accordance with UFC 4-510-01, Section 19: Integration of Building Systems. Refer to Section 2.1 of this document for further requirements.
- 2.21 **Construction.** Construction shall be in accordance with UFC 4-510-01, Section 20. The project shall be designed to take into consideration site conditions and restrictions, site access, staging areas, local labor skills, local materials availability, unique local construction practices, etc. The A-E shall consider design features and finishes that will not require frequent, unusual or expensive maintenance.

2.22 **Wayfinding and Signage.**

- 2.22.1 Exterior signage shall be designed in accordance with UFC 4-510-01, Section 21: Wayfinding and Signage, and any related installation standards and criteria.
- 2.22.2 Interior signage shall be designed in accordance with UFC 4-510-01, Section 21: Wayfinding and Signage, Using Service Interior Design Master Plan, and Interior Design Presentation Format. Graphic materials for interior signage submittals (color boards, placement plans, details and message schedules) shall be included in the Structural Interior Design (SID) binders. Signage design narratives shall be included in this section of Comprehensive Narrative submittals. The User's Manual for interior signage shall be included with the Functional Concept Manual (FCM).
- 2.23 **Food Service.** Food service systems shall be designed in accordance with UFC 4-510-1.
- 2.24 **Acoustics.** Acoustics design shall be in accordance with UFC 4-510-01, Section 23: Acoustics.
- 2.25 **Cost Engineering.** Cost Engineering shall be in accordance with CEHNC-MX and the USACE District Office instructions and guidance. The A-E shall provide a **detailed cost estimate, using the Corps of Engineers M-CACES Gold cost estimating system**, for the construction of this project with Schematic Design Submittal S2 and each subsequent design submittal. Each of these cost estimates shall include, and be supported by, a **market analysis** addressing the impacts for this project of current local labor and materials availability and costs as well as current and anticipated levels of local construction activity. **The detailed cost estimates, with market analyses, shall be received at the Government review offices concurrently with all other documents for each design submittal and shall be checked by the A-E Project Manager prior to their submittal.** Cost Engineering documentation shall be in a separate volume of each design submittal.

2.25.1 Cost Engineering requirements for the Schematic Design Submittal S2 and the Concept Design Submittal S3/S4 are as follows:

- a. The A-E shall provide a **simulated DD Form 1391** (front page only), reflecting the detailed cost estimate for comparison with the official TMA released DD Form 1391 accompanying their current Design Authorization for the project.
- b. The USACE District will review and validate the A-E's detailed cost estimate for these submittals and will prepare an **ENG Form 3086** for each submittal. This validated cost estimate will be available at the start of each design review conference to assure that the estimated project cost is within the overall funding level available for construction of the project and/or to identify any cost or scope problems. The validated cost estimate for the Concept Design Submittal S3/S4 will be included with the presentation of this submittal to TMA. (*"This is the one we have to live with."*) All cost issues must be resolved prior to this presentation.

2.25.2 The USACE District will prepare a HQUSACE “**MILCON CWE/Funds Request Form**” for each final design/construction document submittal (*Encl 14*). The final version of this form will be provided to TMA by the Corps Regional Business Center (RBC)/CEMP-II with the Corps of Engineers request for Advertising Authority for construction of the project.

END – Section 2, Design Requirements

### Section 3 – Submittal Requirements

- 3.1 **Fact-Finding Session / Charrette.** The objective of the Fact-Finding Session/Charrette is to establish an initial design concept for the project. This design concept must be accepted by all key Using Service, USACE representatives and other PDT members before further Concept Design development, including preparation of the required Report on this session, can begin. A Site Verification Visit shall precede the Fact-Finding Session/Charrette to ensure A-E familiarity with the site, availability of utilities and other local conditions. Site photos shall be taken at that time. **Documentation required to be provided by the A-E at the Charrette is listed below.**
- 3.1.1 Confirmation Notices. Confirmation Notices shall be prepared in accordance with Section 1.6.4 of these Design Instructions and distributed in accordance with the Submittal Requirement and Distribution Matrix (SRDM).
- 3.1.2 Executive Summary. Separately bound summary of the Report described in section 3.5.4 herein.
- 3.1.3 Comprehensive Narrative. Brief narrative description of the strong and weak points of each of the proposed schemes and the rationale for any recommended scheme. Address the following features: expandability; flexibility; efficiency (net-to-gross ratios); structural/seismic, mechanical, electrical, communications, life safety and fire protection systems; energy conscious design measures, construction phasing approaches, adherence to Installation Design Guide, and constructibility considerations.
- 3.1.4 Site Plans. Three Design Schemes, include corresponding site plan layouts showing topography, utilities, roads and parking.
- 3.1.5 Block Plans. Minimum of three block plan layout schemes for the project (distinct alternative approaches showing functional departments and adjacencies, occupied/unoccupied space relationships, circulation, future expansion, and external access/egress), reflecting the Program for Design (PFD).
- 3.1.6 Elevations. Include sketch elevations for each of the proposed schemes in sufficient to adequately conduct a review. 3-D CADD massing models and “fly-byes” should also be provided.
- 3.1.7 Report. The A-E shall provide a complete narrative report on the Fact-Finding Session/Charrette, as a Confirmation Notice (CN) within 14 days of its conclusion. The report shall document the proposed and selected schemes (block and site plan layouts, sketch elevations), the decisions made, the direction provided by the Government, and the rationale developed for the selected scheme; provide a revised conceptual level unit price cost estimate for the selected scheme; include site photos, and address any supplemental requirements below for the selected scheme. Prepare a Microsoft PowerPoint presentation of the selected scheme as developed during the Charrette for an out-briefing at the conclusion of the session, as well as for inclusion in the report.



- 3.1.8 Energy Conscious Design. Consider energy conscious design measures that are feasible for the project. For each major system (air handling units, heating source, cooling source) to be provided, replaced, or expanded, discuss the equipment or system alternatives available for Life Cycle Cost Analysis (LCCA) comparison during further Concept Design development.
  - 3.1.8.1 Discuss the types, amount and locations of proposed glazing; heat transfer and shading characteristics; maintenance aspects, and other data pertinent to energy use or natural day-lighting design. Fenestration must consider, in addition to energy transmission, ATFP requirements and installation design requirements.
- 3.1.9 Heating, Ventilating and Air Conditioning Design. Discuss and describe the major mechanical systems required to serve the project, both primary and distribution, including the potential sources of heating, cooling, steam, domestic water, medical gases, waste, etc., as applicable.
  - 3.1.9.1 For new or replacement air handling systems, heating source, and cooling source (as applicable), where more than one system or equipment alternative is reasonably suitable and available, describe the alternative systems or equipment proposed for LCCA comparison during Concept Design development. If expansion or upgrade of existing plant(s) or other major equipment is a practical alternative to provision of new, include this alternative for LCCA comparison.
  - 3.1.9.2 Identify gross building block loads and utility service requirements for HVAC and plumbing services.
  - 3.1.9.3 Design Sketches and Narrative. Show the proposed locations of all Mechanical, Electrical (including communications), and Plumbing (MEP) equipment rooms and plant(s), including existing rooms or plant(s) that may be modified or affected by the project. Consider the vehicular and personnel access requirements for each, and the potential for “stacking” MEP rooms where advantageous. Show or describe the proposed routing of main ducts and major cable trays/raceways from fan, electrical, and communications rooms, as well as the available space (in above-ceiling spaces, etc.) for distribution. As part of floor plan development, each discipline shall identify requirements for utility shafts.
- 3.1.10 Electrical Design. Identify any special conditions, climate and/or specific location design conditions and requirements; equipment and systems for Life Cycle Cost Analysis and energy conscious design consideration; electrical room space requirements and equipment removal routes; location of electrical service and service transformers with primary and secondary voltage.
  - 3.1.10.1 Document coordination with the installation to determine installation design standards and if substation and distribution lines to the site have the capacity to serve typical loads of the project.

- 3.1.10.2 Document existing site electrical conditions and outage history and identify new electrical requirements. Document existing site primary distribution system and power sources. Describe general primary power plant condition. Compare available capacity to programmed facility load plus 20% future load growth. Estimate 150 Va per square meter for the connected loads in ambulatory care centers, 190 Va per square meter for hospitals, and 130 Va per square meter for clinics.
- 3.1.10.3 Document parking area lighting and security lighting requirements; grounding requirements; emergency power requirements; lightning protection requirements; input for preliminary one-line diagram; elevator requirements, if applicable.
- 3.1.10.4 Describe basic interior and exterior electrical concept for power, lighting and distribution.
- 3.1.10.5 Drawings. Show locations of electrical rooms for efficient distribution and identify electrical room space requirements and equipment removal routes. Identify locations of electrical service and service transformer noting primary voltage and secondary voltage ratings. Identify any overhead lines serving project that should be buried. Provide sketch site plans for existing electrical utilities showing electrical distribution and transformers on, and adjacent to the site. If legible, marked up existing site utility plans may be used in lieu of creating new plans. Locate electrical rooms such that regulators are not required to compensate for voltage drops.
- 3.1.11 Communication Design.
- 3.1.11.1 Document any special conditions that will affect the design or cost estimate. Document coordination with installation communications personnel on service requirements and telecommunications site issues. Describe the basics of each communications systems to be included in the project to include function, operation and logistical responsibility.
- 3.1.11.2 Obtain site-specific information on the voice, data, security, and television systems that will serve this facility. Include possible locations for project tie-in-points, utilities that may need to be relocated due to the project location, and ownership of the utilities.
- 3.1.11.3 Drawings. Provide site drawings showing all telephone, data, security and television cables on or near the proposed project site. Locate and size all communications rooms on the architectural floor plans. Document the condition of ductbanks, if applicable.
- 3.1.12 Integration of Building Systems. Discuss and describe the condition of existing equipment and systems that may be modified or expanded under this project.
- 3.1.13 Gross Area Tabulation. Provide a preliminary Gross Area Tabulation for the selected scheme.
- 3.1.14 Cost Estimate. Conceptual level unit price cost estimates for each of the proposed schemes including both site and building costs. These cost estimates are required to ensure that each of the proposed schemes is an appropriate, practical, and cost effective design approach worthy of further development. Provide a market analysis narrative addressing local labor and

material availability, costs, etc.

3.1.15 Fire Protection Design. Include the following information in the narrative report.

3.1.15.1 Fire Reporting System: Identify the fire reporting system on post, including the system manufacturer and model. Indicate all significant system features required (by post Engineering services) to be included in the building fire detection and alarm system, i.e., frequency, type of system, proprietary requirements, etc.

3.1.15.2 Integrated Building System (IBS): Describe the facility system components, if the construction of the facility will follow the IBS configuration for any of the three schemes.

3.1.15.3 Water Flow Test Data: Provide the most current available water flow information for the project site location.

3.2 Not Applicable - Submittal S1 (10% Design). **EDIT IF S1 INTENDED**

3.3 **Submittal S2 (20% Design).** This submittal includes development of the room-by-room floor plans, elevations, and initial analysis of the major architectural and engineering systems based on the selected (or composite) block plan from the charrette. The primary purpose of this submittal and review is to identify and resolve all major space program deficiencies at an early stage in design, develop the massing and aesthetics of the facility, and "fix" the scope of the building. The Design Agent, using Military department representatives, and A-E, if required, will present the reviewed S-2 to TMA-PPMD. Requests for scope revisions with justification should be submitted at this time. Scope changes will not be entertained after approval of S-2 unless fully justified. TMA-PPMD will provide approval/disapproval, with review comments, within 14 days of the presentation. This submittal will be formally presented to TMA-PPMD. The following are the minimum requirements for S2.

3.3.1 Review Comments. All accepted comments generated by the review of the previous submittal(s) shall be incorporated. Exceptions shall be noted in the narrative of the specific discipline in question. Reference Section 1.7 of these Design Instructions.

3.3.2 Confirmation Notices. Confirmation Notices shall be prepared in accordance with Section 1.6.4 of these Design Instructions and distributed in accordance with the Submittal Requirement and Distribution Matrix (SRDM).

3.3.2.1 Executive Summary. Provide Executive Summary addressing various Block Plan alternatives from previous submission, and rationale for the selected scheme. The primary block plan drawings from previous submission shall be included as double-page, fold-out, reduced drawings; summary of the comprehensive narrative describing various proposed architectural and engineering aspects of the projects.

3.3.3 Site Plans. Site plan to include at a minimum: existing buildings, pads, landscaping, walls, and structures; placement of new buildings and structures; site entrance(s), access roads, parking, walks, etc.; future expansion; dimensioned setbacks and clearances, including ATFP

standoffs; existing utilities, both active and abandoned, and proposed connections; landscaping massing and characteristics; circulation flow of staff, laboratory animals, visitors, emergency traffic, service traffic, parking supplies delivery and waste disposal. Site Analysis over current topography survey of site. Consider orientation, terrain, tree cover, soil characteristics, drainage, land use patterns and adjacent land uses, views and historical context.

Site Utility plans shall include all water, fuel, sanitary and storm drainage, power, and communications systems, new and existing. Where clearly legible on a half-sized reproduction, single drawings may include multiple utility services and/or both new and existing lines. Show points of connection for new building services, and location of building entrance.

- 3.3.4 Floor Plans. Floor plans for each floor showing all programmed spaces, corridors, structural grid system (including columns), communications, electrical, and mechanical equipment rooms, and stairs / elevators / escalators to meet the functional requirements. All spaces must be labeled with the room name, the room code from the TMA-PPMD Program For Design (PFD), and the programmed and designed net areas. Indicate circulation pathways for staff and patients. Mechanical and Electrical Rooms shall show equipment outlines based on preliminary sizing/capacity estimates for major equipment. For addition/alteration projects, preliminary demolition drawings, with photographs to depict conditions are required.
  - 3.3.4.1 A separate plan of the blast hardened/CBR protected area, if programmed, showing how the spaces would be utilized during contingency operations. Exterior elevations and major building sections appropriate to the level of Concept Design development. To assure Post or Base compatibility, observe and document the physical features of the site and the character/style of any surrounding building(s)
- 3.3.5 Single Line Distribution Systems. Single line drawings shall be provided for Mechanical-Electrical-Communications-Plumbing (MECP) systems, showing the routing of the main duct, piping services, and cable tray systems.
- 3.3.6 Elevations. Exterior elevations and major building sections appropriate to the level of Concept Design development. To assure Post or Base compatibility, observe and document the physical features of the site and the character/style of any surrounding building(s).
- 3.3.7 3-D CADD Model. Refined 3-D CADD massing model, from previous submission, as required.
- 3.3.8 Comprehensive Narratives and Calculations. Prepare and submit in accordance with UFC 4-510-1, Appendix B, paragraph B.2.8, and paragraph 2.2.1 of this document, and as modified herein. List all applicable design criteria, with titles and issue dates. Where “tapping into” existing services is contemplated, discuss impact within each respective disciplinary section, as outlined in the paragraphs below, on existing capacity and the means (user logs, testing or metering methods, other field investigations, etc.) used by the designer to establish this information. Describe available capacities of utility services and, based on investigations and best projections, evaluate whether these can support the project. Identify in general terms any

demolition or upgrade work that will be necessary to provide utility services to the project. It is understood that while all such investigative work for existing service capacity may not be completed for Submittal S2, this work shall be completed for the Concept Design Submittal/Submittal S4.

3.3.8.1 Civil Design. Describe the proposed design, and include site investigation and utilities reports based on further refinement of the previous submission requirements.

3.3.8.2 Architectural. Address the overall architectural concept including: Exterior wall systems and finish materials being considered, (develop alternative exterior materials and wall assemblies, compare each exterior wall scheme by both qualitative and quantitative analysis and include energy-conscious design considerations; prepare dew point calculations following recommended design procedures in the ASHRAE Handbook of Fundamentals; acoustics, base architectural plan, floor-to-floor heights, proposed roofing materials, slope(s), styles, contingency and mobilization features, energy conservation features, life safety, and fire protection features, and Uniform Federal Accessibility Standards (UFAS) compliance.

a. As applicable, update Fact-Finding Session/Charrette Report for the selected scheme. Discuss design intent, overall architectural concept, architectural style and compatibility of building with installation master plan and installation design guide.

b. Initial Structural Interior Design (SID) and Comprehensive Interior Design (CID) binders. See Interior Design Presentation Format, Attachment 10, for specific submittal requirements including SID binder requirements for interior signage.

3.3.8.3 Structural. Alternative Structural Systems. A minimum of three structural systems shall be thoroughly evaluated and submitted with a recommended selection of a structural system based on an economic study. The structural system selected shall be the one which best combines economy and suitability regarding functionality, design systems, space configuration, architectural features and seismic (Section 6) resistance configuration for the specific project. The comparative study shall address the cost of foundations and superstructure as well as appropriate cost factors for architectural, fire protection, mechanical, electrical, and seismic conditions where these vary between structural systems.

Provide a narrative justification of the proposed design, describing the basis for system selection, along with drawings of the selected structural system adequately developed so that no additional major engineering decisions are required, shall be provided. The economic study shall employ a method, which considers all factors and requirements of the system's total life cycle costs. The method employed shall incorporate cost per unit of area, erection time, compatibility with other systems, nonstructural flexibility, lateral load resistance, noise attenuation and the natural vibration period of the structure, when applicable. For facilities two stories or greater located in regions of high or moderate seismic risk, as determined in Section 6, at least one structural system that includes components that provide base isolation or active or passive energy dissipation should be included as a structural system alternative.

3.3.8.4 Seismic. Summarize the seismic design considerations and the level of protection required. Discuss post-earthquake operation requirements.

3.3.8.5 Energy and Water Conscious Design. Report the climatic conditions at the project location. Identify the "weather tape" location that will be used to model load conditions, identifying any significant climatic differences between the weather station data and actual conditions at the site. Identify the computer modeling programs proposed for analyses. Identify energy source(s), availability and cost. Based on the climate, energy sources, and building type, provide a short summary or list of energy conservation considerations that are potentially feasible and cost-effective for this project. Identify any "special" features or systems normally in use at and/or recommended by the installation.

3.3.8.6 Heating, Ventilating, Air Conditioning (HVAC). Heating, Ventilation, and Air Conditioning (HVAC) Design Narrative. Provide a comprehensive description of the HVAC design. Discuss design considerations and space requirements for the primary and secondary HVAC systems being considered.

a. Identify locations and sizes of available site utilities, including any "district" heating or cooling distribution systems.

b. When life cycle cost analyses are required by criteria, for each major mechanical systems, including air-handling units, heating source, and cooling source, propose a minimum of three systems or equipment alternatives for Life Cycle Cost Analysis for the Concept Design Submittal/Submittal S4. Where three practical alternatives do not exist (as agreed between the A-E, geographic district, and CEHNC-MX), a lesser number of alternatives shall be studied.

c. Report on the existence of any medical facility-wide or installation-wide Energy Monitoring and Control System and whether the Using Service will require interface between that system and the project Direct Digital Control system.

d. Calculations. Establish the gross building block loads and utility service requirements (heating, cooling, and any others).

3.3.8.7 Plumbing & Medical Gases. Discuss design considerations and space requirements for the various plumbing systems, including domestic hot and cold water, fuel gas, medical gases, sanitary waste, acid waste, and storm drains. Discuss water supply, quality, required storage, and distribution systems.

a. Describe requirements for water treatment.

b. Calculations. Establish utility service requirements (water, waste disposal and any others).

3.3.8.8 Electrical. Discuss design considerations and space requirements for electrical systems. Address the following: voltage, routing, and reliability of primary services; connected and

demand load; normal and essential electrical system; emergency power; lighting systems; and energy conservation features.

- a. Report on the survey of existing primary distribution system and power sources as they apply to project power requirements. Describe existing primary distribution system and power sources, including available capacity at selected connection point(s). Describe general primary plant condition and outage history. This discussion should cover new cable, duct-banks, substations, transformers, switching stations and circuiting required for the new facility. Identify major primary system deficiencies and preliminary costs to correct. Discuss related Installation utility projects. Compare available capacity to programmed facility load plus 20 percent future load growth. Check for existing local standby power sources.
- b. Identify any local specific design requirements to accommodate site-specific conditions, climate and local practice. Identify potential criteria conflicts and significant special costs related to special design.
- c. Describe the preliminary design for: Power and lighting to include primary power service, transformers, power distribution centers and distribution systems to be used throughout the new facility, alternate power sources, lighting systems (to include exit and egress lighting), grounding system, corrosion control, and special requirements for selected areas.
- d. Describe the rationale for Electrical systems and equipment selection, various alternative systems or equipment considered and rejected, and justifications for decisions made.
- e. Calculations. Provide preliminary load calculations for major equipment based on volt-amps per square meter for lighting, small appliances, and equipment items; preliminary short circuit current; preliminary voltage drop calculations as necessary to support system or wiring method chosen and Lightning risk analysis. Indicate load calculation methods used for determining rating of transformer, switchgear, motor control centers and power distribution panels.

3.3.8.9 Communications. Discuss design considerations and space requirements for all communications systems as defined in section 2. Provide a list of governing criteria, codes and standards, with titles and issue dates. Obtain, and verify site-specific information.

- a. Identify and describe, in detail, the existing communications, data and TV systems serving the project site including the following:
- b. Ownership of the installation telephone switching equipment.
- c. Existing Dial Central Office location; size, type, manufacturer, and model of telephone switch; age of switch; current software load; nearest telephone cable; proposed location of service connection; cable routing and capacity of each of these items to support the



new facility.

d. Narrative describing all communications systems in great detail. Include purpose, operating features, configuration, procurement responsibility and proposed location of each system.

e. Locate and size all communications rooms per UFC 4-510-01, Section 11: Communications and ANSI/EIA/TIA569. Rooms should be located away from both electrical and mechanical rooms. Rooms should be located in a manner so that they are central to the areas they serve. Provide supporting calculations and narrative for your choice of quantity, size and arrangement of rooms.

3.3.8.10 Fire Protection. The narrative shall individually address New (replacement), and Altered/Renovated areas or portions of buildings, to include type of construction, fire rating of materials, occupancy classification, fire detection, alarm, and suppression systems. For Renovation or Addition-Alteration projects, provide a summary of the latest Fire Safety Evaluation System Study (FSES) for the existing facility; if an FSES has not been developed, a comprehensive evaluation of the existing facility is required per Section 2. of this document. If Interstitial Building Spaces are planned for other than medical centers/teaching hospitals, provide an expanded justification. Provide a list of applicable codes and criteria and indicate the edition or date of these documents. For all projects, address the following:

a. Provide a general building description for the selected scheme. Include all operational features and program information that will impact the fire safety assessment, i.e., evacuation procedures, etc. Include an assessment of risk to property and loss of operation and provide recommendations for safe operation.

b. Provide a preliminary descriptive narrative addressing the following fire protection and life safety features for the selected scheme. For existing facilities, include the results of the Building Code and Construction Survey, Fire Protection Systems Survey and the Life Safety Assessment Survey. The following information shall be provided (*Indicate "NA" for those items that are not applicable*):

(1) Type of occupancy classification, including mixed occupancies, special occupancy definitions, classification of hazard of contents and occupant load.

(2) Analysis of allowable fire areas and increases per UFC 3-600-01, including type of building construction, use group classification, height (meters and number of stories), fire areas, fire resistance requirements of building construction elements, and fire ratings for materials.

(3) Exposure protection and building separation from other buildings and/or property lines.

(4) Occupancy separations per NFPA 101 and UFC 3-600-01 criteria.

(5) Subdivision of building spaces with locations of all fire and smoke barriers and fire walls including International Building Code and NFPA 101 fire resistance and separation requirements.

(6) Analysis of smoke generation and flame spread rating considerations for interior finishes.

(7) Protection of vertical openings, including enclosure requirements for stairs, elevators, conveyors, dumbwaiters, chutes, atriums, malls, light wells, etc.

(8) Life safety egress considerations per NFPA 101, including types and numbers of exits; capacity, arrangement and protection of means of egress; maximum travel distances; marking and illumination of means of egress; emergency lighting, etc.

(9) Fire Detection and Alarm System (FDAS) and voice communication requirements for field devices, central equipment and installation reporting systems. Indicate FDAS requirements for coordination with other building systems, i.e., HVAC, elevators, fire extinguishing systems, etc. Provide a description of existing local fire alarm reporting system, including manufacturer, model, NFPA-defined circuit performance style, and type of supervision, i.e., central station, proprietary, auxiliary, etc.

(10) Water supply and storage requirements, including preliminary building fire flow demand and water duration. Investigate the reliability and availability of the existing water supply system in support of any proposed water-based fire extinguishing systems. Analysis shall include available primary and secondary water supply and storage arrangement. Provide a description of the water storage and distribution system.

(11) Fire suppression/extinguishing systems including functional description, design criteria requirements, and type and location of system equipment. Where both systems are required determine benefits of separate systems versus a combination sprinkler/standpipe system.

(12) Establish smoke management performance criteria; indicate the objective and scope for smoke control and management within the building. Indicate the type(s) of smoke control and management proposed to meet criteria. Identify the building systems that must be interfaced to provide smoke management. Include a summary of design considerations, control parameters and operational features.

(13) Calculations. Exiting calculations per NFPA 101, including occupant load, exit width, exit, and exit access capacity (number of people per exit), remoteness of exits, and, exit passageway and convergence capacity.

3.3.8.11 Security Narrative. Summarize the security systems design parameters and the major features of the design.

- 3.3.8.12 Anti-Terrorism Force Protection (ATFP) Narrative. Discuss siting and design considerations, and any space requirements for antiterrorism force protection systems. Coordinate with installation for any installation-specific requirements. Include confirmation of installation's approval. Describe ATFP design features to be included in design. Show required standoff distances on Site/Civil conceptual site plan.
- 3.3.8.13 Interstitial Building Spaces Narrative. If Interstitial Building Spaces are planned for other than medical centers/teaching hospitals, provide an expanded justification.
- 3.3.8.14 Construction Phasing Narrative. For addition/alteration portions of projects, such as the phasing and connection to the existing facilities, provide a narrative description of the proposed Construction Phasing to evaluate the continued/uninterrupted operation of the existing facility during construction and the associated impact on the construction cost. Identify requirements for temporary buildings to serve as swing space during the construction and the cost associated with these buildings.
- 3.3.8.15 Waste Management Design Narrative. Describe proposed waste handling methodology and space requirements, circulation, utility requirements, etc.
- 3.3.8.16 Commissioning Narrative. Prepare draft Commissioning Plan. Describe systems to be included in the commissioning plan and identify responsible parties.
- 3.3.8.17 Gross Area Tabulation. Gross area tabulation of floor area, along with a small scale, single-line, dimensioned key plan, to reflect the total space required in UFC 4-510-1, Figure 2-5 format.
- a. Net Area Tabulation. Net area tabulations, including net to gross calculations, in UFC 4-510-1, Figure 2-6 format.
  - b. Net-to-Gross Area Conversion Summary. A net-to-gross area conversion summary comparing the as-designed condition with the applicable net-to-gross square feet allowances.
- 3.3.9 Preliminary Massing Model (if required).
- 3.3.10 Cost Estimate Documentation. Provide a detailed cost estimate in a binder separate from other design documentation. The AE shall address total estimated cost for the selected scheme as compared to overall budgeted amount for the construction of the project. Highlight any significant cost issues, i.e., topography, geotechnical conditions, utilities, building systems and materials, ATFP requirements, hazardous materials, compliance with installation design guide, additional user requirements, missing information, etc. that may affect this and future cost estimates. Provide a market analysis narrative addressing local labor and material availability, costs, etc.
- 3.3.10.1 Simulated DD Form 1391 Markup.

3.3.10.2 ENG Form 3086 (prepared and submitted by USACE District).

3.3.11 S2 Checklist. Submit in accordance with paragraph 2.2.4 of these Instructions.

3.4 **Not Applicable - Pre-Concept Design Submittal S3 (30% Design).**

3.5 **Concept Design Submittal S4 (35% Design).**

3.5.1 This submittal is a minimum 35 percent of the total design effort in all disciplines and includes a corrected and refined S2 package based on the S2 review. The Design Agent along with designer of record and the using Military Department will present the S4 package to TMA-PPMD and the NIBC Master Planning Working Group at the start of the review period. After the review conference, the reviewed and corrected S4 will be submitted to TMA-PPMD for the record. A-E participation will be required. Final scope and cost shall be determined with this submission. The minimum requirements of this submission are the same as described for an S3 submission in UFC 4-510-01. A copy of the final VE Study will also be submitted for the record. The purposes of this submittal are to update the Comprehensive Narrative, calculations, tabulations, sketches and drawings, data sheets, catalog cuts, etc. to fully explain and support the design, finalize all major design/engineering decisions, validate project scope and cost, and in general ensure that a completely workable Concept Design is developed for the project. This is considered a technical submission and all issues regarding cost, VE, constructability, phasing, etc., must be resolved. The cost estimate for this submittal, as validated and approved by the geographic district, will determine the overall budgeted amount for the construction of the project. The following are the minimum Concept Design Submittal/Submittal S4 requirements.

3.5.2 Submittal Review Comments. All approved comments generated by the review of the previous submittal shall be incorporated. Exceptions shall be noted in the narrative of the specific discipline in question. Reference Section 1.7 of these Instructions.

3.5.3 Confirmation Notices. Confirmation Notices shall be prepared in accordance with Section 1.6.4 of these Instructions.

3.5.4 Executive Summary. Reference UFC 4-510-1, Appendix B, Section B.2.1. An Executive Summary (in addition to the other submittal requirements) to include design intent, proposed architectural engineering systems, results of VE study, phasing plans, costs, scope, and a general description of the project. Include sufficient detail to provide an overview of the project. The Executive Summary shall be bound separately from other submittal documents.

3.5.5 Site Plans. Update and expand upon previous submittals to include at a minimum plans showing building location, future expansion, existing and proposed structures/site improvements, topography, utilities including communications (voice, data, TV), roads, parking, landscaping, demolition, grading, lighting, erosion and sediment control, contractor's lay down area, traffic control, etc.

- 3.5.6 Plans. Update and expand upon previous submittals to provide plans showing design in sufficient detail to allow an in-depth technical review and development of a reliable unit cost estimate.
- 3.5.6.1 Provide plans for each floor showing all programmed spaces, corridors, structural grid system, columns, electrical/mechanical/communications/specialty rooms and stairs/elevators and other conveyance systems to meet the functional requirements. All spaces must be labeled with the room name, room code from the authorized PFD and the programmed and designed net areas.
- 3.5.6.2 Exterior Elevations. Update and expand upon previous exterior elevations and major building sections to provide sufficient information and detail to allow an in-depth technical review.
- 3.5.6.3 Reflected Ceiling Plans. Update and expand upon previous reflected ceiling plans for all spaces showing: grid system(s), lighting fixtures, HVAC supply and return grilles, speakers, ceiling mounted communications equipment, special ceiling finishes, changes in ceiling heights, special lighting features, strobes, annunciators, etc.
- 3.5.6.4 Equipment Plans. Update and expand upon previous equipment plans showing all category A, B, C, D, E, F, and G equipment. Show Category A, B, and E equipment on the equipment drawings and floor plans with solid lines and Category C and F equipment with dashed lines. Provide Joint Schedule Numbers (JSN) as indicated in the Medical Facility Room Contents List (MFRCL) for all applicable logistical categories. The Joint Schedule Numbers (JSN) or the National Stock Numbers (NSN), within the MIL-STD 1691, shall not be used as substitutes for contract specifications and detail drawings. Citing JSN numbers and nomenclatures will not relieve the designer of the responsibility to verify and provide all necessary detail drawings and specifications showing actual dimensions, utility connections, accessories, quantity, quality, and performance required. Where reference to a specification is included in a JSN item description, items identified as Category "A" in "CAT" column shall be procured against the latest authorized specification or purchase description. Designers shall assure current specifications and their latest amendments or purchase description shall be used in the procurement of equipment supplied by the Construction Contractor.
- 3.5.6.5 HVAC Plans. Update and expand upon previous submissions showing layout of mechanical rooms with all major equipment and one line drawing of distribution systems. Distribution mains shall be dimensioned. Identify all HVAC control zones; provide flow diagrams for HVAC heating and chilled water systems as applicable; provide locations and sizes of storage and prime moving equipment for all systems; provide locations of all outside air intakes and exhaust air discharge points. Provide complete utility equipment room drawings in plan and elevation showing major equipment of all disciplines, including architectural, and structural elements, and required access, maintenance, and NFPA 70 dedicated space requirements
- 3.5.6.6 Plumbing Plans. Update and expand upon previous submissions. Include main piping routing including riser diagrams and sizes for all systems and provide locations and sizes of storage and prime moving equipment for all systems. Provide complete utility equipment room drawings in plan and elevation showing major equipment of all disciplines, including

architectural, and structural elements, and required access, maintenance, and NFPA 70 dedicated space requirements.

- 3.5.6.7 Electrical Plans. Update and expand upon previous submissions. Provide as a minimum the electrical legend, list of abbreviations, site plans with the primary distribution, site lighting, and equipment location and layout; the location and layout of all electrical rooms including closets; lighting fixtures and switching; general purpose receptacles and special receptacles and outlets for equipment rooms; power one-line diagrams and interface connection points; grounding one-line diagram including power, communication, and lightning protection system bonding; lightning protection plans with details; lighting fixture schedule (Including lamp types, color rendering index, and color temperature); point-to-point power and lighting wiring for each typical room and area; and typical panel schedules.
- 3.5.6.8 Communication Plans. Update and expand upon previous submissions. Provide at a minimum the following: Riser diagrams for selected zones of all communications systems including all major system components, indicating proposed locations for all equipment; Communications site utility plans for voice, data and TV systems indicating any and all communications ductwork, manholes, hand-holes, and cable routing required to tie the new facility into the existing installation-wide networks/systems. Indicate all existing communications cables on, or adjacent to the immediate project site. Supplement abbreviations list and legend of symbols for all communications symbols that are unique to a specific application. Provide communications floor plans showing the locations of all communications outlets and equipment. These plans shall include the equipment and furniture layouts without the equipment numbers to ensure the communications outlets are coordinated with the furniture and equipment. The minimum acceptable scale for the communications floor plans is 1 to 50. In lieu of the communications floor plans for this submittal the designer may provide typical drawings of each room type showing the communications outlets, furniture and equipment.
- 3.5.6.9 Fire Protection Plans. Update and expand upon previous submissions including the following.
- a. Life Safety/Building Code Composite Plans (minimum scale 1:100 or 1/8"-1'). Provide a set of architectural floor plans with room names and numbers, including primary and secondary circulation, stairs, elevators, vertical openings, utility rooms and shafts, and structural support elements with the following indications superimposed:
  - b. Indicate occupancy classification and sub-classification per NFPA 101, and Use Group Classification per International Building Code (IBC) of all fire areas.
  - c. Indicate Smoke Compartmentation zones.
  - d. Indicate location of all fire-rated walls including fire-rated doors and dampers with identification as applicable (fire area separation, smoke barrier, occupancy and exit separation, horizontal exit, and smoke partition, etc.) including specific fire-resistance ratings.

e. Indicate locations of all required exits, exit capacities (number of people per exit), means of egress and travel distances.

f. Indicate actual maximum travel distances on each floor and compartment, both to an exit and to a smoke barrier (where smoke compartments are code-required), as required by NFPA 101.

g. Fire Protection System Plans. Update and expand upon previous submissions. Provide a coordinated set of floor plans with the following systems information:

h. Locations of all sprinklered areas (including system, type, classification of hazard of contents, and respective sprinkler design densities) the zoning of which shall be coordinated with the building smoke compartments, where applicable, and indicate locations of other areas protected by other automatic extinguishing and suppressions systems.

i. Locations of fire alarm zones. Indicate the locations of all FDAS control and annunciation panels. Indicate all connections for notification, monitoring and control. Indicate zoning of FDAS initiating and indication circuits. Indicate locations of connected devices which provide inputs to the HVAC control system for smoke management or NFPA 90A requirements.

3.5.7 Comprehensive Narratives, Catalog Data, and Calculations. Update and expand upon previously submitted narratives.

3.5.7.1 Site / Civil Design. Reference Section 2.3 and the following specific requirements. Discuss all aspects of design as developed. Confirm availability of adequate capacities of site utilities or provide descriptions, and related costs, of necessary modifications to provide adequate capacities.

3.5.7.2 Architectural. Reference Section 2.4 and the following specific requirements. Address overall architectural concept including interior finishes (in accordance with UFC 4-510-1, Appendix A), exterior finishes (in accordance with Installation Design Guide, as applicable), wall systems, roofing systems, acoustics, floor-to-floor heights, contingency and mobilization features, energy conservation features, UFAS features, functionality, circulation, etc.

3.5.7.3 Structural. Reference Section 2.5 and the following specific requirements. Discuss basis of design, loads assumptions, allowable unit stresses, ATFP considerations, and seismic design provisions as applicable.

3.5.7.4 Seismic. Reference Section 2.6 and the following specific requirements. Describe seismic bracing, restraint and protection features to be provided for non-structural building systems and installed equipment.

3.5.7.5 Energy Conscious Design. Reference Section 2.7 and the following specific requirements. Describe proposed energy conservation equipment and features, window selection, and



passive solar, solar shading and natural day-lighting design considerations. Describe U-value and elements of building envelope, including insulation and vapor retarder (with calculations).

3.5.7.6 Heating, Ventilating, Air Conditioning. Reference Section 2.8 and the following specific requirements.

- a. Describe design intent and basis of design. Describe all aspects of HVAC design including a summary of building loads and service demands and the considerations that went in to system and equipment selection. Describe all sources of HVAC and utility services. Describe the approach to equipment sizing including ductwork and piping (equipment redundancy, duct/piping velocity limitations, pressure loss per unit of length, etc.)
- b. Describe the proposed HVAC control system and the required extent, if any, of interface with any medical facility-wide or installation-wide Energy Monitoring and Control System (EMCS).
- c. Catalog cuts with dimensional and performance data for the major equipment upon which preliminary establishment of mechanical room space has been based. For air handling units, include data from at least two manufacturers, including data for all major components.
- d. Describe the anticipated acoustical treatment requirements (structural/airborne transmission and duct-borne noise), including silencers, duct lining and other acoustical insulating materials as needed. Reserve space in fan rooms for supply fan attenuation, unless preliminary calculations clearly indicate this will not be required.
- e. HVAC Air Balance Summary Table listing each conditioned or ventilated room or space. This table shall show the required maximum and minimum airflow rates to meet conditioning and ventilation requirements, relative pressurization, and whether room or space air is returned or exhausted. See Air Balance Form for format.
- f. Describe seismic design elements and aspects of the HVAC design. If piping systems subject to thermal expansion must be seismically braced, describe the approach to coordinating the design of piping supports and thermal expansion equipment with provisions (including anchors, guides, "ells" offsets, etc.) for seismic bracing.
- g. Discuss water treatment requirements for chilled water, heating water, or steam generating systems or equipment. Describe design features for the control of legionella bacteria.
- h. Calculations. Room-by-room, block (per air handling unit), and building heating and cooling design loads or demands for the project. Cooling loads may use "rules of thumb" for individual room lighting and equipment loads at this stage of design. The designer is advised, however, that any calculations showing occupied space airflow "engineering check figures" of less than 5-6 L/s/m<sup>2</sup> will potentially be closely questioned.

-- Life Cycle Cost Analyses for system and equipment selections.

-- Sizing information for major equipment.

-- Relative humidity level projection calculations may be deferred to final design, providing the designer reserves adequate space in air handling equipment rooms to accommodate in-unit or in-duct humidifiers if later proven to be required.

-- Fan noise duct-transmission/attenuation calculations may be deferred to final design if the designer reserves adequate space in air handling equipment rooms to accommodate noise attenuators if later proven to be required.

3.5.7.7 Plumbing. Update and expand upon previous submissions. Reference Section 2.9 and the following specific requirements.

- a. Comprehensive description of design intent and basis of design. Describe all aspects of the plumbing and medical gases/compressed air/vacuum design, including a summary of service demands with the considerations that went into system and equipment selection. Explain the sources of all utility services. Describe the approach to equipment sizing, including piping, (equipment redundancy, piping velocity limitations, pressure loss per unit of length, etc.).
- b. Catalog cuts with dimensional and performance data for the major equipment upon which preliminary establishment of mechanical room space has been based.
- c. Provide a table showing all medical gas, compressed air and vacuum outlets by room. Required type and number of medical gas services shall be as determined by the Using Service using UFC 4-510-01, Appendix A and the Medical Design Guide Plates for general guidance.
- d. Describe seismic design elements and aspects of the plumbing/medical gases design. If piping systems subject to thermal expansion must be seismically braced, describe the approach to coordinating the design of piping supports and thermal expansion equipment with provisions (including anchors, guides, "ells" offsets, etc.) for seismic bracing.
- e. Discuss water treatment requirements for domestic water, or steam generating systems or equipment. Describe design features for the control of legionella bacteria.
- f. Calculations. Calculations of plumbing (including medical gas, compressed air and vacuum) design loads or demands for the project and sizing information for major equipment.

3.5.7.8 Electrical. Update and expand upon previous submissions. Reference Section 2.10 and the following specific requirements.

- a. Power and lighting design to include the service, transformers, connections interfaces, power distribution centers and distribution systems to be used throughout the building; essential electrical system and subsystems; alternate power sources; lighting systems; isolated power systems; X-ray power system; grounding system for patient care; lightning protection system; corrosion control; electrical seismic requirements; and special requirements for selected areas.
- b. Electrical Systems Analysis and Equipment Section with Life Cycle Cost Analyses results where applicable, alternative systems or equipment considered and rejected, and justification for that selected. Rationale for selection of reduced voltage starting, Power Factor correction and power conditioning equipment.
- c. Updated survey results of existing primary system and site conditions.
- d. Work phasing plan.
- e. Calculations for normal and emergency power systems. Load calculations for determining ratings of transformers, generator capacity (if applicable), switchboards, automatic transfer switches, motor control centers, and power distribution panels. Load calculations shall be based on watts per square meter for lighting, small appliances and medical equipment except sterilizers.
- f. Lighting Criteria Schedule All areas will be listed numerically, with room names, criteria illumination levels (maintained and initial illumination levels) for general and task lighting, and type lamps (with color rendering index, and color temperature). Repetitive areas may be cross-referenced. Note special design features requirements.
- g. Lighting calculations for typical rooms and typical exterior areas.
- h. Preliminary short circuit calculations, power system short circuit analysis.
- i. Voltage drop calculations as necessary to support system or wiring method chosen.
- j. An Energy Impact Analysis or statement for all systems or equipment considered.

3.5.7.9 Communications. Update and expand upon previous submissions. Provide communications narrative describing the design history, purpose, operational features, configurations, logistical responsibilities, interfaces with existing and other systems, and established locations of each communications system. Provide a list of contacts from all offices and agencies with which the CSE has coordinated the design.

- a. Submit an initial Telephone Station Requirements Matrix as detailed in UFC 4-510-01, Section 11 Communications. Identify in every space: Room number and description; Local intercom; Numbers and types of outlets; Numbers and type of lines and instruments; Telephone features package.

- b. Prepare sizing calculations/rationale for all communications rooms, raceways, service entrance conduits, risers and trunk cables.

3.5.7.10 Fire Protection. Update and expand upon previous submissions. Reference Section 2.13, Fire Protection and the following specific requirements.

- a. Develop and update narrative addressing the fire protection and life safety features of the project. All provisions pertaining to fire protection shall be addressed. Indicate "NA" for those items that are not applicable. List applicable codes and criteria and the edition of each.
- b. Type of occupancy classification, including mixed occupancies, special occupancy definitions, classification of hazard of contents and occupant load.
- c. Analysis of allowable fire area and height increases per UFC 3-600-01, including type of building construction, use group classification, height (meters and number of stories), fire area and separation requirements, fire-resistance requirements of building construction elements, and fire ratings of materials.
- d. Exposure protection and building separation from other buildings and/or property lines.
- e. Occupancy separations per NFPA 101 and UFC 3-600-01 criteria.
- f. Subdivision of building spaces with locations of all fire and smoke barriers and fire walls including International Building Code and NFPA 101 fire resistance and separation requirements.
- g. Interior wall finish and interior floor finish including class, flame spread and smoke developed ratings. Indicate extent of plastics to be provided as finish materials.
- h. Protection of vertical openings, including enclosure requirements for stairs, elevators, escalators, conveyors, dumbwaiters, chutes, atriums, malls, light wells, etc.
- i. Life safety egress considerations per NFPA 101, including types and numbers of exits; capacity, arrangement and protection of means of egress; maximum travel distances; discharge from exits; exit marking and illumination of means of egress; emergency lighting; special security features; etc.
- j. Fire Detection and Alarm System (FDAS) and voice communication requirements for field devices, central equipment and installation reporting systems with a description of the central station fire alarm reporting system. Indicate facility operations that impact selection of FDAS with consideration given to type of evacuation, patient and staff evacuation procedures, and layout of smoke/fire compartments. Include functional description of alarm initiating and alarm indicating requirements, signaling circuits and appliances, circuit performance styles, sequences of operations, zoning and annunciation

of alarm and supervisory signals, and interface with building and fire protection systems. Indicate system configuration (conventional hardwired, addressable, multiplex, intelligent, etc.), and type of signal communication (digital, analog, etc.). Indicate FDAS requirements for coordination with other building systems, i.e., HVAC, elevators, fire extinguishing systems, etc.

k. Analysis and description of available primary and secondary water supply and water storage requirements. Include types and locations of system equipment, design criteria requirements, and preliminary building fire flow demand and water duration.

-- If a standpipe system is proposed, preliminary analysis shall include a combination sprinkler/standpipe system.

-- If water flow test results support a fire pump and/or tank installation, indicate design criteria in accordance with NFPA criteria, equipment type, arrangement, capacity, and pump ratings. Include pump equipment power, alarm and supervision requirements, automatic and manual fire pump control requirements, and FDAS interface and supervision requirements.

l. Smoke management performance criteria; indicate the objective and scope for smoke control and management within the building. Indicate the type(s) of smoke control and management proposed to meet criteria. Identify building systems that must be interfaced to provide smoke management. Include a summary of design considerations, control parameters and operational features.

m. Layout requirements for fire extinguisher cabinets.

n. Facility features for emergency power distribution, including control and switching requirements for life safety, critical and equipment loads with load shedding and restoration features as applicable.

o. Special hazards and features, which may impact, fire protection, such as:

- (1) Security (electric door releases, door hardware, locking arrangements, etc.).
- (2) Malls/atriums.
- (3) Automatic data processing and electronic facilities.
- (4) Elevator control/FDAS interface.
- (5) Emergency power.
- (6) Emergency vehicle easements.
- (7) Explosion prevention.
- (8) Flammable and combustible liquids handling and storage.
- (9) High-frequency electrical equipment.
- (10) Hyperbaric and hypobaric facilities.
- (11) Medical gas and vacuum systems (compressed).
- (12) Medical gas handling and storage.
- (13) Radio Frequency Interference (RFI) shielding.
- (14) Underground structures/areas.

- (15) Waste handling (medical and hazardous).
- (16) Windowless structures/areas.
- (17) Integration of Building Systems (IBS) Design.

p. Water Flow Test and Report. Perform a water flow test and provide the test report in accordance with requirements of paragraph 2.13 of these Instructions. Coordinate with the geographic district Project Manager.

-- Report shall include a diagram of the water distribution system and flow test arrangement, a description of the test, hydraulic characteristics of flow and test hydrants, and water flow test data, including available static pressure, water capacity and residual pressure, and a graph of the water supply curve with demand points indicated.

q. Calculations.

-- Exiting calculations per NFPA 101, including occupant load, exit width, exit and exit access capacity (number of people per exit), remoteness of exits, and exit passageway and convergence capacity. For "total" evaluation of high-rise facilities, provide occupant egress flow-time calculations per NFPA 101A.

-- Provide hydraulic calculations per UFC 3-600-01, NFPA 13 and NFPA 14 for the sprinkler or combination sprinkler/standpipe system when complete system design is required. For performance designs, provide preliminary calculations for the assessment of system demand. Include end head flow and pressure, flow increase due to balancing, system friction loss, hose stream flow with associated pressure loss, etc.

-- Provide calculations per UFC 3-600-01 and NFPA 22 for required water storage capacity, supply and sizing calculations for water storage vessels.

-- Provide calculations to verify the water supply can meet the fire flow and pressure demand of the sprinkler and/or combination sprinkler/standpipe system. Investigate capability of existing water storage and duration to meet the demand of the proposed system.

-- If a fire pump is required, provide fire pump/booster pump sizing calculations per UFC 3-600-01 and NFPA 20. Design pump(s) capacity between 125-140 percent of capacity for a standard size pump.

3.5.7.11 Interstitial Building System. If an interstitial building system was previously approved update the design parameters and the major features of the design.

3.5.7.12 Food Service. When applicable, summarize the food service systems design parameters and the major features of the design. Discuss the various systems considered and the economic basis for the system selections.

3.5.7.13 Materials Handling and Transportation. Summarize the materials handling and transportation systems design parameters and the major features of the design. Include, as

applicable escalators, elevators, cart lifts, automatic box conveyor systems, dumb-waiters, linen and trash chutes, pneumatic tubes, etc. The narrative is to also address equipment requirements, life-cycle-costs, maintenance, appearance, ease of operation, noise, security, maintainability, and availability in a competitive marketplace for each system.

- 3.5.7.14 Waste Handling Systems. Summarize the waste handling systems design parameters and the major features of the design. Address trash removal; hazardous, infectious, and biological waste; retort sterilizers, incinerators; and other waste handling features of the design.
- 3.5.7.15 Security Systems. Summarize the security systems design parameters and the major features of the design.
- 3.5.7.16 AT/FP. Summarize the AT/FP systems design parameters and the major features of the design. Describe required standoff distances, barriers, building air intakes, etc.
- 3.5.7.17 Wayfinding and Signage. Summarize the wayfinding and signage systems design parameters and the major features of the design.
- 3.5.8 Bidability, Constructability, Operability and Environmental (BCOE) Review (By USACE District). Reference Section 1, paragraph 1.11.
- 3.5.9 Seismic Design Concept Report. Reference Section 2.6 for specific requirements.
- 3.5.10 Gross Area Tabulation. Reference Section 2, paragraphs 2.1.4 and 2.2.7.
- 3.5.11 Net Area Tabulation. Reference Section 2, paragraphs 2.1.4 and 2.2.8.
- 3.5.12 Net-to-Gross Area Conversion Summary. Reference Section 2, paragraphs 2.1.4. and 2.2.9.
- 3.5.13 Cost Estimate. Provide a unit cost estimate based on the most current design documents. The estimate shall be submitted at the same time as the remainder of the submittal and shall have been checked by the A-E Project Manager prior to submission to the government. Estimate to include a current market analysis narrative addressing local labor and material availability, costs, etc.
- 3.5.14 CWE Form / Form 3086 (by USACE District). The geographic district (USACE District) shall validate the A-E's estimate and prepare the standard USACE Current Working Estimate (CWE) Form as well as the Form 3086 as applicable.
- 3.5.15 A-E shall provide a marked up DD Form 1391C reflecting designed cost and scope.
- 3.5.16 Outline Specifications. Lists all proposed UFGS specifications and identify any special specifications required for the project.



- 3.5.17 Room Finishes. Unless noted otherwise room finishes shall be in accordance with latest edition of UFC 4-510-1, Appendix A or as modified by the PDT. Variations shall be specifically noted in the Comprehensive Narrative.
- 3.5.18 Equipment List. Reference Section 2, paragraph 2.16.
- 3.5.19 Value Engineering Study. Reference Section 1, paragraph 1.10.
- 3.5.20 S4 Checklist. Reference Attachment 7b and Section 2, paragraph 2.2.4.
- 3.5.21 Electronic Media. Submit in accordance with geographic district instructions. All presentations shall be in Microsoft PowerPoint electronic media.
- 3.5.22 Perspective Sketch and 3-D CADD. Sketch to be used as the basis for a rendering. Reference Section 1, paragraph 1.7.6 and Section 2, paragraph 2.2.11.
- 3.5.23 Rendering. A final rendering is prepared after 35 Percent Design Submission approval. A color photograph of the original rendering, approximately 500 mm X 400 mm (20 x 16 inch) in a 700 mm X 500 mm (28 x 20 inch) brushed aluminum frame shall be forwarded to TMA-PPMD. The photograph is to reflect the 35 percent review comments and be titled, matted, framed, and glazed with nonglare tempered glass or Plexiglas. Other photographs are to be distributed as scheduled by the Design Agent in coordination with the using Military Department.
- 3.5.24 Structural Interior Design (SID) / Comprehensive Interior Design (CID) including Exterior Color Boards.
- 3.5.25 Project Management Plan (by USACE District). Reference Section 1, paragraph 1.5 of this document.
- 3.5.26 Presentation Material for TMA-PPMD and NIBC Master Planning Working Group Briefing. Reference 1.7.7 for specific information and requirements.
- 3.5.27 Outline Functional Concept Manual (FCM). Outline of the entire Functional Concept Manual with draft narrative describing design issues and how functional and medical planning relationships were developed.
- 3.5.28 Operation and Maintenance Manuals. Reference Section 2, paragraph 2.3.10.
- 3.5.29 Value Engineering Study (VE). Reference 1.10 of these Instructions. Conduct Value Engineering (VE) study during design in accordance with DoD Directive 4245.8. Value Engineering Studies consist of investigations of certain high-cost areas in a design to determine if an alternate way exists to achieve an improved design at a lower life-cycle-cost. The main objectives of VE studies are reduced life-cycle-cost and improved quality of design. The application of Value Engineering shall not result in lowering criteria or quality standards as established by the guidance in this document or reduction in the scope of the project. The

purposes of this submittal are to further develop the TMA-PPMD approved S2 Submittal and to finalize all major design/engineering decisions and to validate project scope and cost.

- 3.6 **Submittal S5 (65% Design).** The purpose of this submittal is to expand upon the technical aspects of the Concept Design Submittal/Submittal S4 and related design/engineering decisions in order to develop initial final design/construction documents for the project. The USACE and Using Service review offices will conduct a comprehensive technical review to ensure conformance with the approved Concept Design and applicable design guidance and criteria.
- 3.6.1 Submittal Review Comments. All approved comments generated by the review of the previous submittal shall be incorporated. Exceptions shall be noted in the narrative of the specific discipline in question. Reference Section 1.7 of these Instructions.
- 3.6.2 Confirmation Notices. Confirmation Notices shall be prepared in accordance with Section 1.6.8 of these Instructions.
- 3.6.3 Executive Summary. Update previously submitted Executive Summary in accordance with UFC 4-510-1, Appendix B, Section B.2.1. Provide as a separate volume. Summarize Comprehensive Narrative disciplinary narratives. Site Plans. Update and expand upon previous submittals to include at a minimum the plans indicated on the SDRM.
- 3.6.4 Plan//Drawing Requirements.
- 3.6.4.1 Civil/Site. Update and expand upon previous site and utilities plans to provide sufficient information and detail to allow an in-depth technical review, to include as a minimum.
- a. Existing layout – horizontal control.
  - b. Demolition plan(s).
  - c. Layout plan(s) showing circulation, building expansion, detail plans.
  - d. Grading plan(s), detail plans.
  - e. Pavement layout plan(s), profiles, details.
  - f. Landscaping plan(s), details.
  - g. Utilities plan(s), details. See below for additional requirements.
- 3.6.4.2 Architectural. Update and expand upon previous submittals to provide plans showing design in sufficient detail to allow an in-depth technical review and development of a reliable unit cost estimate.
- a. Composite floor plans – largest scale to fit on one drawing sheet.
  - b. Floor plans showing all floors, circulation, rooms and spaces with titles and numbers; omit room codes from Program for Design, and programmed and as-designed net areas.
  - c. All exterior elevations and major building sections, identify construction materials.
  - d. Reflected ceiling plans and details including acoustical treatment, ceiling mounted speakers and strobe lights.
  - e. Room finish schedule(s).
  - f. Roof plans and details.
  - g. Interior elevations.

- h. Toilet room plans, elevations and details.
- i. Door schedule(s).
- j. Window and glazing schedules and details.
- k. Wall sections and details.
- l. Partition types and details including acoustical treatment.

3.6.4.3 Equipment and Casework. Updated and expanded upon previous information and provide plans and elevations showing all Log Cat A, B and E items and any Log Cat C and F items requiring unique utilities, structural support and/or verification of spatial arrangement or capacity. Show Log Cat A, B and E items with solid lines and Log Cat C and F items with dashed lines. Provide Joint Schedule Number (JSN) identification for all Log Cat A, B and E items and any Log Cat C and F items show.

3.6.4.4 Integration of Building Systems.

a. Provide multi-disciplinary plant and equipment room plans and elevations at 1:50 (1/4'-1') scale. Show all primary equipment and distribution elements (piping, cable tray, ductwork, and fittings - dimensioned); structural and architectural elements affecting space availability; and space required for equipment maintenance, operation (including straight duct runs for air measuring stations, sound absorbers, and humidifiers where applicable), replacement, and electrical code clearances. Show at least two elevation views of air handling units. Where equipment in existing plant or equipment rooms is significantly altered or expanded under this project, drawings and elevations shall also depict existing equipments.

b. Provide cross-sectional views showing typical above-ceiling and utility chase equipment (ductwork, piping, conduit, cable tray, terminal equipment, etc.), at "choke points" or congested locations. Minimum requirements are:

(1) Cross-sections shall show all mechanical, fire protection, electrical, communications, structural, and architectural elements at that location in sufficient scale and detail to show that installation, change-out, maintenance, access, and cooling air circulation space requirements are met.

(2) Dimensions indicated for ductwork and piping shall be take into consideration space needed for joining, reinforcement, and support requirements (including seismic bracing, if applicable), and include allowances for insulation.

(3) Approximate duct/piping dimensions for branch feeders for which sizing calculations have not yet been performed.

(4) Consider realistic elevations of drainage and vent piping, reflecting properly sloped installation. Include a detail of one roof drain and, if a two story facility, one soil stack turndown, to show the required clearance for installation.

3.6.4.5 Mechanical. Update and expand upon previous submissions showing mechanical systems to include all major equipment and distribution systems. Coordinate with Integration of Building Systems (IBS) drawings to avoid drawing duplication.

a. Schematic Drawings. Provide separate flow and control (as applicable) schematics for all mechanical systems, including but not limited to those listed below. Include existing systems modified or extended for this project. Label all equipment with a unique identifier corresponding to equipment schedules.

(1) Chilled water, heating water, steam, a condensate piping systems.

(2) Plumbing (including gas, air, and vacuum) piping systems. By schematic or riser diagram, indicate relative system locations of all major medical gas system components, including isolation and zone shutoff valves, and sensor locations for master and area alarms.

(3) Plumbing (including gas, air, and vacuum) piping systems. By schematic or riser diagram, indicate relative system locations of all major medical gas system components, including isolation and zone shutoff valves, and sensor locations for master and area alarms.

(4) Controls diagrams and Input/Output tables.

b. Plan Drawings. Scale floor plans at minimum 1/8-inch per foot scale and mechanical equipment rooms and the congested areas of energy plants at 1/4-inch per foot scale. Show mechanical equipment against the appropriate, up-to-date, architectural floor plan background. Plant and equipment room plans shall be developed to a near-completion level, subject to modifications found necessary in further design development. Other plans as listed shall be developed to an approximately 65 percent completion level.

(1) Ductwork plans showing all main, run-out, and branch ducts with duct-mounted, terminal, and fixture equipment. Include existing equipment where this affects, or is affected by, project work. Show or describe ductwork pressure classifications. Plans shall show or tabulate the required airflow rates at all terminal air fixtures (diffusers, return grills, lab hoods, etc.). Show the location of all ducted equipment, including airflow monitoring stations, fans, humidifiers, filters, balancing and automatic dampers and splitters, terminal units, and reheat coils. The locations of zone thermostats and humidistats shall also be shown.

(2) Distribution piping plans showing the size and locations of mechanical system equipment including mains, run-outs, branches, risers, pumps, expansion tanks, air removal equipment, isolation and balancing valves, and other associated equipment. Summarize the results of all Life Cycle Cost Analyses and other economic analyses. Show and size thermal expansion compensation fitting, ells, offsets, etc., and the location of required guides and anchors. Where seismic bracing may interfere with thermal piping expansion, show the location of the seismic braces with appropriate details.

(3) Equipment space drawings. In coordination with the IBS Design drawing requirements, show equipment room, plumbing fixture, and exterior equipment locations and layouts including all equipment and distribution elements for all disciplines, including architectural and structural elements, thermal insulation, NEC dedicated space requirements, equipment maintenance and access space. Plans shall include a minimum of two elevation views for each major air handling unit and equipment room. Include existing equipment and equipment rooms included in project work.

(4) Demolition drawings. Provide separate ductwork, HVAC piping, medical gas, and plumbing demolition plans where required to clearly depict or describe the work. Detailed demolition notes shall be provide as necessary.

c. Miscellaneous Drawing Requirements. The following drawings shall be developed to an approximately sixty-five (65) percent completion level:

(1) Equipment details showing the correct installation, arrangement, support, bracing, connection, and any special fabrication requirements for all mechanical equipment items. These shall show all ancillary components for equipment including, but not limited to, shutoff, balancing or control valves, flexible fittings or connectors, strainers, instrumentation, vibration isolation features, condensate drains, air removal fittings, and housekeeping pads.

(2) Sequences of operation shall be provided for all automatically controlled mechanical equipment.

(3) Equipment schedule for all mechanical equipment to include capacity, performance, dimensional, and/or connection requirements, as applicable. Capacity information should be available for all major plant equipment and air handling units at this design stage.

3.6.4.6 Electrical. Refer to the requirements for Integrated Building Systems Drawings, to avoid repetition. Update and expand upon previous submissions. Provide as a minimum the electrical legend, list of abbreviations, site plans with the primary distribution, site lighting, and equipment location and layout; the location and layout of all electrical rooms including closets; lighting fixtures and switching; general purpose receptacles and special receptacles and outlets for equipment rooms; power one-line diagrams and interface connection points; power riser diagram; grounding one-line diagram (including power, communication, and lightning protection system bonding); lightning protection plans with details; lighting fixture schedule (Including lamp types, color rendering index, and color temperature); point-to-point power and lighting wiring for each room and area; and typical panel schedules. The abbreviation and legend symbols shall conform to ANSI standard Y32-9 and ANSI Y32.2.

a. Electrical site plans shall indicate underground primary feeders; location of duct banks

and manholes; location and rating of outdoor switchgear and transformers and secondary wiring; exterior lighting (type and location including street, parking, walkway, security, obstruction, controls and wiring.

b. Electrical plans shall be grouped legend (symbols, abbreviations, general notes and etc), electrical demolition, electrical new [site electrical, power floor plans, power single-line diagrams, riser diagram, grounding one-line diagram (including power, communication, and lightning protection system bonding), details, panel schedules, feeder schedules, lighting floor, lighting fixture schedules, light fixture guide plates (details), lightning protection plans and details, and etc.)].

3.6.4.7 Communications. Update and expand upon previous submissions. Provide at a minimum the following.

- a. Complete riser diagrams for all communications systems including all major system components, indicating proposed locations for all equipment.
- b. Communications site utility plans for voice, data, security and TV systems indicating any and all communications ductwork, manholes, hand-holes, and cable routing required to tie the new facility into the existing installation-wide networks/systems. Indicate all existing communications cables on, or adjacent to the immediate project site.
- c. Provide detail drawings for each type of communications device and or communications outlet.
- d. Provide arrangement drawings for each communications room to include plan drawings and elevation drawings of each wall that has equipment mounted to it.
- e. Supplement abbreviations list and legend of symbols for all communications symbols that are unique to a specific application.

3.6.4.8 Fire Protection. Update and expand upon previous submissions.

a. Life Safety Composite Plans. Coordinate disciplines to ensure integrity of structural fire resistance:

-- Approach 1: Keep composite plans in drawing package and use as reference for coordination of trades in systems installation to maintain structural fire resistance rating. The composite plans are provided for information only.

-- Approach 2: Indicate fire resistance rating of walls and partitions on the architectural floor plans and provide a general note on all other discipline floor plans to reference fire protection requirements of barrier penetrations.

b. Update life safety and fire resistance information. Provide fire resistance rating information and design detail on Partition Types or Schedule Sheet.

c. Interim Life Safety Measures (ILSMs). For Alteration or Renovation project, provide drawings, notes, and details as required to clearly communicate the required ILSMs on a phase by phase, department by department basis.

d. Fire Detection and Alarm System (FDAS). Plans shall be provided to show all interfaces between the FDAS and other building systems, i.e., utility control system, elevator control panel, HVAC, etc. Indicate connection points for panels and equipment requiring AC power, the location of all FDAS control and annunciation panels, and connections for notification, monitoring and control. Indicate zoning of FDAS initiating and indicating circuits and locations of connected devices, which shall be coordinated with the smoke compartments (zone) layout.

(1) Provide single line riser diagram for all initiating, signaling and alarm supervisory devices and circuits. Indicate all central equipment and system zoning arrangements.

(2) Provide a matrix of the sequence of operations indicating all combinations of input/output alarm and supervisory functions.

(3) Floor plans shall indicate specific types and locations of control panels, batteries and chargers, transmitter, annunciator, fusible safety switch, remote trouble device, alarm initiating and indicating devices, and connections to appliances and fire extinguishing system switches and controls. In addition, show the location of fire alarm master box, circuit runs to installation fire alarm system (if telegraphic or telephonic), and to building control panel. Provide mounting details for master box including radio antenna installation for transmitter. Indicate connection points for panels and equipment requiring AC power. Provide a layout drawing of the control room indicating the location of all central FDAS and fire protection equipment, power supplies, and annunciator section.

Plans shall indicate location of all sprinkled areas (including system, type, classification of hazard of contents, and respective sprinkler design densities), the zoning of which shall be coordinated with the building smoke compartments and indicate locations of areas protected by other automatic extinguishing and suppression systems. The sprinkler system shall be supervised by the building FDAS.

d. Automatic Fire Extinguishing System(s).

(1) Provide a Riser diagram to include all valves and appurtenances, controls, switches, drains and drain discharge locations, and pipe sizes. Where diagram requires more than two risers, provide an isometric riser layout. Include standpipe, and fire/booster and jockey pump arrangements. Include gaseous extinguishing agent storage locations, where applicable.

(2) Floor Plans for Sprinkler and Standpipe System. Indicate limits of different sprinkler and standpipe systems types. Clearly define which areas receive different



design densities. Show locations of risers, valves, fire department connection, system supervisory alarms, drains, inspector's test connection, fire and jockey pumps, pump controllers and floor control valves. Show size and location of feed and cross-mains. Indicate location of hydraulically most remote areas. Installation of fire and jockey pumps includes layout of supply and discharge piping, valves, meters, testing devices, control equipment, etc. as required. Include water storage tank design as required. Where fire pump is enclosed in separate room, include a layout of all supply and discharge piping, pumps, controller and accessory equipment to ensure adequate space for installation, maintenance, inspection, testing and supervision.

e. Smoke Management Plans. Schematic diagrams of interface features for building systems (HVAC/utility control/sprinkler/ FDAS systems) for smoke control and management functions. Schematic diagrams and details for the coordination of smoke control features. Provide a coordinated layout of all smoke compartments with HVAC system layout, sprinkler zones, and FDAS initiating and indicating circuits. Provide coordination and sequence of operations of controls for HVAC/smoke control outputs with FDAS inputs. Provide a matrix for the sequence of operations of fire alarm inputs and smoke control outputs.

3.6.4.9 Demolition Plans. Update and expand upon previous submissions. Identify all areas/elements of hazardous materials. Show all system elements to be demolished, clearly defining limits of demolition and points of connection for temporary services or extensions.

#### 3.6.4.10 Construction Phasing

a. Update and expand upon previous submissions. Provide separate schematic and floor phasing plans, per each discipline, as necessary to clearly convey all required actions and responsibilities. Show all modifications, temporary or permanent, to existing structure, engineering systems, and life safety features in detail, along with detailed step-by-step phasing instructions are required for each discipline. For each major phase or sub-phase of construction, plans shall clearly delineate limits of contractor's working area, permissible contractor access routes, and locations of dust barriers. Show, and describe as required for clarity, all required Interim Life Safety Measures on a phase by phase, department by department basis. Reference Section 1 requirements for Protection of Medical Facility During Construction for additional requirements.

b. Provide a Gantt chart, or equivalent Time-Activity chart, showing each significant phase or sub-phase of construction in the sequence in which the work is to occur. Include all significant activities affecting the work, such as User move-out or move-ins.

3.6.5 Comprehensive Narratives, Catalog Cuts, and Supporting Calculations. Update and expand upon previously submitted narratives, calculations, tabulations, sketches, data sheets, catalog cuts, etc. as required to explain and support the design.

3.6.5.1 Site/Civil. Update and expand upon previously submitted analysis and narrative.

3.6.5.2 Architectural. Update and expand upon previously submitted analysis and narrative.

3.6.5.3 Structural. Update and expand upon previously submitted analysis and narrative.

3.6.5.4 Seismic. Update and expand upon previously submitted analysis and narrative.

3.6.5.5 Energy Conscious Design. Update and expand upon previously submitted analysis and narrative. Verify compliance with UFC 3-400-01.

3.6.5.6 Sustainability. Update and expand upon previously submitted analysis and narrative.

3.6.5.7 Heating, Ventilating, Air Conditioning.

a. Design Narrative. Update and expand upon previously submitted narrative. Provide a comprehensive description of the design intent and basis of design. Describe all HVAC systems and list all criteria, directives, regulations and guidelines upon which the design is based. Include an HVAC Air Balance Summary Table. See Attachment 11, Air Balance Form for format. Summarize the results of all analyses and calculations. Discuss the means of acoustical control of noise generated by mechanical equipment through ducts and walls.

b. Calculations. Update room-by-room, block (per air handling unit), and building heat gain/loss demand loads based on installed lighting and equipment, envelope heat transfer, occupants, required ventilation and all other factors normally considered in these calculations. Loads shall be determined by analysis of actual as-designed conditions for each individual space, not by “rules-of-thumb”.

(1) Calculate room supply, return, ventilation or exhaust air requirements based on the heat gain/loss calculations, total and outside air change/ventilation requirements and temperature, humidity, ventilation and pressurization criteria for each room or space.

(2) Calculate duct and pipe main sizes, including risers and size the run-outs from the mains.

(3) Relative humidity level projection calculations may be deferred to final design, providing the designer reserves adequate space in air handling equipment rooms to accommodate in-unit or in-duct humidifiers if later proven to be required.

(4) Update equipment-sizing calculations. Include sizing calculations for all system components including, but not limited to, heat exchangers, air handlers, boilers, chillers, cooling towers, storage tanks and manifolds, reserve supplies, coils, filters, humidifiers, diffusers, registers, grilles, pumps, steam traps, water heaters, and water treatment equipment, as applicable to the project.

(5) Calculate outside air ventilation rates for each space and air handling system,

showing compliance with the most stringent of UFC 4-510-1, Appendix A, exhaust makeup, or ASHRAE Standard 62-2001.

(6) Calculate airborne (duct-borne, duct breakout, equipment room breakout) noise generation and the necessary attenuation to maintain the specified room noise criteria levels. For duct-borne noise, as a minimum calculate noise transmission from the supply and return fans to the first room served by the respective system, including noise regeneration at terminal units. If the “first room served” experience noise problems, extend analysis to succeeding rooms.

(7) Update piping calculations for all HVAC systems. Where existing utilities are “tapped into” to provide services for the new facility, show that they can adequately handle new demands.

3.6.5.8 Plumbing/Medical Gas. Update and expand upon previously submitted narrative. Reference Section 2 of this document, and the following additional specific requirements.

- a. Update Comprehensive description of design intent and basis of design. Describe all aspects of the plumbing and medical gases/compressed air/vacuum design (as applicable), including a summary of service demands with the considerations that went into system and equipment selection. Explain the sources of all utility services. Describe the approach to equipment sizing, including piping, (equipment redundancy, piping velocity limitations, pressure loss per unit of length, etc.).
- b. Update Catalog cuts with dimensional and performance data for the major equipment upon which preliminary establishment of mechanical room space has been based.
- c. Update table showing all medical gas, compressed air and vacuum outlets by room. Required type and number of medical gas services shall be as determined by the Using Service using UFC 4-510-01, Appendix A and the Medical Design Guide Plates for general guidance.
- d. Update description of seismic design elements and aspects of the plumbing/medical gases design.
- e. Discuss water treatment requirements for domestic water, or steam generating systems or equipment. Describe design features for the control of legionella or other bacteria.
- f. Calculations. Calculate pipe main sizes, including risers, and size the run-outs from the mains.

-- Update equipment sizing calculations for all system components including, but not limited to, heat exchangers, storage tanks and manifolds, reserve supplies, pumps, steam traps, water heaters, and water treatment equipment, as applicable to the project.

-- Update piping calculations for all plumbing/medical gases systems, as applicable. Where existing utilities are "tapped into" to provide services for the new facility, show that they can adequately handle new demands.

3.6.5.9 Electrical. Update and expand upon previously submitted narrative. Reference Section 2.10 and the following additional specific requirements.

- a. Update comprehensive description of design intent and basis of design including lighting calculations for typical rooms and lighting calculations for the remaining rooms. Add ISO foot-candle or lux plots for all rooms with task lighting criteria and lighting for exterior area near emergency, as applicable.
- b. Complete short circuit analysis, ground fault, and power coordination analysis.
- c. Power system coordination.
- d. Electrical work coordinated phasing plan, Gannt charts, and commissioning plans.
- e. Update calculations for normal and emergency power systems, equipment and lighting selections.

-- Voltage drop calculations for all feeders and worst case branch circuits and short circuit calculations.

3.6.5.10 Communications. Update and expand upon previously submitted narrative. Reference Section 2.11 and the following additional specific requirements.

- a. Update comprehensive description of design intent and basis of design. Update design history, purpose, operational features, configurations, logistical responsibilities, interfaces with existing and other systems, and established locations of each communications system.
- b. Update Telephone Station Requirements Matrix as detailed in UFC 4-510-01, Section 11 Communications. Identify in every space: Room number and description; Local intercom; Numbers and types of outlets; Numbers and type of lines and instruments; Telephone features package.
- c. Update sizing calculations/rationale for all communications rooms, raceways, service entrance conduits, risers and trunk cables.

3.6.5.11 Fire Protection. Update and expand upon previously submitted narrative. Reference Section 2.12 and the following additional specific requirements.

- a. Update comprehensive description of design intent and basis of design. Address all provisions of the fire protection and life safety features of the project. Indicate "NA" for those items that are not applicable, and address the following systems:

- (1) Fire Detection and Alarm System (FDAS) including sequence of operations for activation, monitoring, control, and interface of other systems and equipment.
- (2) Water supply and storage systems and automatic sprinkler and standpipe systems including tanks, pumps, and controllers, etc.
- (3) Automatic fire extinguishing system(s).
- (4) Smoke control/exhaust systems and controls (FDAS/EMCS coordination) including all modes of operation, i.e., normal, emergency, failure and supervisory, monitoring and control modes.
- (5) Description of type, location, quantity and extent of application of spray applied fireproofing and fire-stopping methods.
- (6) Provide a section in the narrative titled "Approaches and Concerns". This section shall include complete description and documentation of any issue, such as a deviation from or a waiver of established criteria, conflicts of criteria or any other problem that arises during design development and could become problematic during construction or operation.
- (7) Provide an updated description of the Interstitial Building Spaces Design, as applicable.

b. Calculations. Update previous submission calculations, including occupant load and exit access capacity; adequacy of water supply to meet demand of fire extinguishing systems; water storage capacity and sizing calculations for water storage vessels; fire pump sizing; and verify water flow test data.

3.6.5.12 Food Service. Update and expand upon previously submitted narrative.

3.6.5.13 Materials Handling and Transportation. Update and expand upon previously submitted narrative.

3.6.5.14 Waste Handling Systems. Update and expand upon previously submitted narrative.

3.6.5.15 Security Systems. Summarize the security systems design parameters and the major features of the design.

3.6.5.16 AT/FP. Update and expand upon previously submitted narrative.

3.6.5.17 Wayfinding and Signage. Update and expand upon previously submitted narrative.

3.6.6 Biddability, Constructibility, Operability and Environmental (BCOE) Review (By Geographic District). Reference Section 1, paragraph 1.11.

- 3.6.7 Seismic Design Concept Report. Reference Section 2.6 for specific requirements.
- 3.6.8 Gross Area Tabulation. Reference Section 2, paragraphs 2.1.4 and 2.2.7.
- 3.6.9 Net Area Tabulation. Reference Section 2, paragraphs 2.1.4 and 2.2.8.
- 3.6.10 Net-to-Gross Area Conversion Summary. Reference Section 2, paragraphs 2.1.4. and 2.2.9.
- 3.6.11 Cost Estimate. Provide a unit cost estimate based on the most current design documents. The estimate shall be submitted at the same time as the remainder of the submittal and shall have been checked by the A-E Project Manager prior to submission to the government.
- 3.6.12 CWE Form / Form 3086 (By Geographic District). The geographic district will validate the A-E's estimate and prepare the standard USACE Current Working Estimate (CWE) Form as well as the Form 3086 as applicable.
- 3.6.13 DD Form 1391C.
- 3.6.14 Draft Specifications. Electronic "Marked up" UFGS specification sections and other draft specification sections for requirements for which UFGS are not available or are inadequate.

Provide the following SpecsIntact lists and reports with the draft specifications:

- Address Verification Report
- Bracket Verification Report
- Section Verification Report
- Submittal Verification Report
- Reference Title Report
- Reference Location List
- Submittal List
- Submittal Register
- Test Requirements List

- 3.6.15 Draft Submittal Register. Provide draft ENG Form 4288, Submittal Register.
- 3.6.16 Room Finishes. Unless noted otherwise room finishes shall be in accordance with latest edition of UFC 4-510-1, Appendix A. Variations shall be specifically noted in the Comprehensive Narrative.
- 3.6.17 Equipment List. Reference Section 2, paragraph 2.16.
- 3.6.18 Value Engineering Study. Reference Section 1, paragraph 1.10.
- 3.6.19 Electronic Media. Provide in accordance with geographic district guidance.

- 3.6.20 Exterior Rendering. Provide exterior rendering based on approved sketch provided with Submittal S4. Rendering shall be in accordance with Section 1, paragraph 1.7.6 and Section 2, paragraph 2.2.11.
- 3.6.21 Structural Interior Design (SID)/Comprehensive Interior Design (CID)
- 3.6.22 Exterior Color Boards.
- 3.6.23 Project Management Plan (By Geographic District). Reference Section 1, paragraph 1.5 of this document.
- 3.6.24 Outline Functional Concept Manual (FCM). **Provide if Required by User.** Outline of the entire Functional Concept Manual with draft narrative describing design issues and how functional and medical planning relationships were developed.
- 3.6.25 Operation and Maintenance Manuals. Reference Section 2, paragraph 2.3.10.

- 3.7 Submittal S6 (100% Design).** The purpose of this submittal is to provide the final design/construction documents for the project. This submittal is intended to satisfy the Contracting Officer, and the USACE and Using Service (Army) review offices that all design/construction documents are complete and conform to all applicable design guidance and criteria. The following are the minimum Submittal S6 requirements.
- 3.7.1 Submittal Review Comments. All approved comments generated by the review of the previous submittal shall be incorporated. Exceptions shall be noted in the narrative of the specific discipline in question. Reference Section 1.7 of these Design Instructions.
  - 3.7.2 Confirmation Notices. Confirmation Notices shall be prepared in accordance with Section 1.6.4 of these Design Instructions.
  - 3.7.3 Executive Summary. Update previously submitted Executive Summary in accordance with UFC 4-510-1, Appendix B, Section B.2.1.
  - 3.7.4 Plans. Update all plans of all disciplines, elevations, sections, details, etc. to incorporate all approved submission comments and guidance from the previous submission(s). This final version of the plans shall fully support the design intent, systems selection, and specified materials.
  - 3.7.5 Comprehensive Narratives, Catalog Cuts, and Calculations. Reference paragraph 2.2.1 of these Project Delivery Instructions. Update each section to incorporate all approved submission comments and guidance from the previous submission. This final version of the Comprehensive Narrative and Calculations shall fully support the design intent, systems selection, and specified materials.
  - 3.7.6 BCO Review.
  - 3.7.7 Seismic Design Concept Report.
  - 3.7.8 Gross Area Tabulation.
  - 3.7.9 Net Area Tabulation.
  - 3.7.10 Net-to-Gross Area Conversion Summary.
  - 3.7.11 Updated Detailed Cost Estimate.
  - 3.7.12 USACE CWE Form / Form 3086.
  - 3.7.13 DD Form 1391C.
  - 3.7.14 Final Specifications. All UFGS specification sections and other draft specification sections for requirements for which UFGS are not available or are inadequate.



Provide the following SpecsIntact lists and reports with the draft specifications:

- Address Verification Report
- Bracket Verification Report
- Section Verification Report
- Submittal Verification Report
- Reference Title Teport
- Reference Location List
- Submittal Llist
- Submittal Register
- Test Requirements List

3.7.15 Room Finishes.

3.7.16 Equipment List.

3.7.17 Equipment Specifications.

3.7.18 Comprehensive Interior Design.

3.7.19 Electronic Media

- 3.8 **Backcheck Submittal (100% Design).** The purpose of this submittal is to provide verified final design/construction documents for the project, updated as necessary after the Submittal S6 review. This submittal must satisfy the Contracting Officer, TMA-PPMD, USACE and Using Service review offices that these documents are in conformance with the approved scope and budget and all applicable guidance and criteria. This submittal shall include the following requirements in addition to the updated Submittal S6.
- 3.8.1 Review Comments. Incorporate Previous Submittal Review Comments. All approved comments generated by the review of the previous submittal(s) by all appropriate offices shall be incorporated. Exceptions shall be noted in the narrative of the specific discipline in question. Reference Section 1.7 of these Design Instructions.
- 3.8.2 Confirmation Notices. Confirmation Notices shall be prepared in accordance with Section 1.6.8 of these Project Delivery Instructions.
- 3.8.3 Executive Summary. Update previously submitted Executive Summary in accordance with UFC 4-510-1, Appendix B, Section B.2.1.
- 3.8.4 Plans. Update all plans, elevations, sections, details, etc. of all disciplines to incorporate all approved submission comments and guidance from the previous submission. This final version of the plans shall fully support the design intent, systems selection, and specified materials
- 3.8.5 Comprehensive Narrative, Catalog Cuts, and Calculations. Reference paragraph 2.2.1 of these Project Delivery Instructions. Update each section to incorporate all approved submission comments and guidance from the previous submission(s). This final version of the Comprehensive Narrative shall fully support the design intent, systems selection, and specified materials.
- 3.8.6 Statement of Design Conditions (SOC). Provide in accordance with paragraphs 2.13.2.3 and 2.13.2.4 (Check if References Correct) of these Instructions.
- 3.8.7 Construction Phasing Plans
- 3.8.8 BCO Review
- 3.8.9 Seismic Design Concept Report
- 3.8.10 Gross Area Tabulation
- 3.8.11 Net Area Tabulation
- 3.8.12 Net-to-Gross Area Conversion Summary
- 3.8.13 Cost Estimate

3.8.14 CWE Form / Form 3086

3.8.15 DD Form 1391C

3.8.16 Specifications

3.8.17 Room Finishes

3.8.18 Equipment List

3.8.19 Equipment Specifications

3.8.20 **Interior Design.** Final Structural Interior Design (SID) and Comprehensive Interior Design (CID). See Interior Design Presentation Format for specific submittal requirements including SID binder requirements for interior signage. Include written responses to review comments on previous submission.

3.8.21 Electronic Media

3.9 **Bid Documents / Amendments**

3.9.1 General. Electronic Bid Sets shall be used in accordance with USACE District direction.

3.10 **Sustainability Study.** As applicable, the A-E shall complete a Sustainability Study within 10 days of construction contract award, or as directed by the USACE District.

3.10.1 General. (To be Determined)

3.11 **Project Management Plan (PMP).**

3.11.1 General. To be developed as a living document and as part of the P2 process in accordance with USACE PPMD policy and guidance.

3.12 **Functional Concept of Operations Manual.** To be determined in accordance with biosurety and safety personnel during design development.

3.13 **As-Built Documents.** The final design/construction documents shall require the construction contractor to provide complete as-built drawings for this project upon completion of construction. These as-built drawings shall be provided in reproducible format and in electronic format, including 3-D CADD files, in accordance with guidance and instructions from the USACE District.

3.14 **Statement of Conditions (SOC).**

3.14.1 General. Provide in accordance with paragraphs 2.13.2.3 and 2.13.2.4 of these Instructions.

3.15 **Comprehensive Interior Design (CID)**

3.15.1 General.

3.16 **Structural Interior Design (SID)**

3.16.1 General.

#### 4.0 Attachments List

- Attachment 1 Design Authorization.
- Attachment 2 DD Form 1391.
- Attachment 3 Program For Design (PFD).
- Attachment 4 Reserved
- Attachment 5 Reserved
- Attachment 6 Submittal Requirements and Distribution Matrix (SRDM)
- Attachment 7a Submittal S2 Check List.
- Attachment 7b Concept Design Submittal/Submittal S4 Check List.
- Attachment 8 Proposed Project Schedule.
- Attachment 9 Functional Concept Manual (FCM).
- Attachment 10 Interior Design Presentation Format (USHFPA)
- Attachment 11 Air Balance Form.
- Attachment 12a Equipment and Casework Schedule.
- Attachment 12b Equipment Data sheet format.
- Attachment 13 Facilities Survey Report for Installation of X-ray Systems.
- Attachment 14 Reserved.